February 10, 1947

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

EDITORIAL INDEX, PAGE 57

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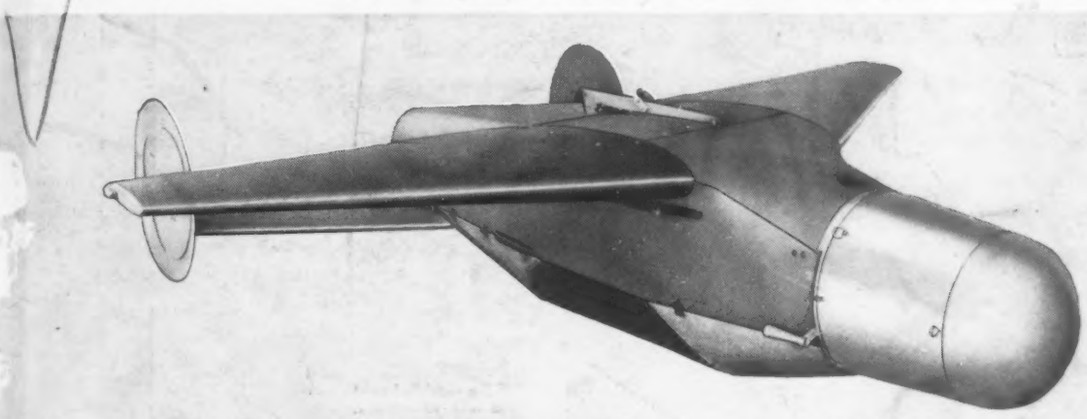
DETROIT

The secret weapon no Jap ship could dodge



Story of the NAVY BAT*

Could a way be found to penetrate enemy anti-aircraft fire . . . and blow each Jap ship to bits . . . *without* losing our pilots?

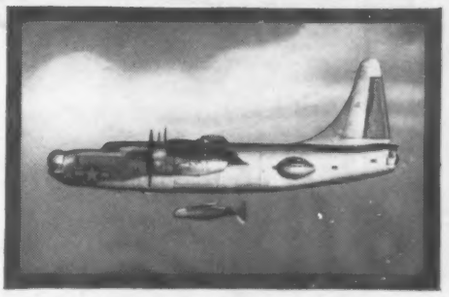
That was the urgent question. And American genius answered with the Navy Bat—a radar-guided glider bomb.

Designed to glide silently at 300 miles per hour—with a 1,000-pound bomb in its belly—the Bat was carried by a Navy patrol bomber.

At a point five miles from the target, the "mother" plane would aim the Bat at a Jap ship and release it. From then on the Bat automatically followed every twist or turn of the enemy ship—and smashed into the dodging Jap.

Used against Jap destroyers, tankers, picket boats—and land installations—this weapon was so effective the enemy thought we had a suicide pilot inside each Bat.

Instead, the Bat contained revolving radar gear to search for the target—and tiny gyroscopes to correct for errors in flight.



"Mother" plane—five miles from target—aims the Bat, releases it, and turns away from enemy anti-aircraft fire. Bat glides ahead.

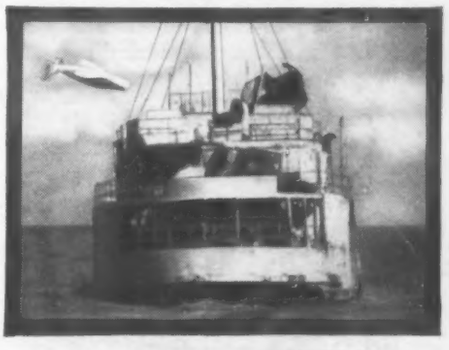
and its 36 BALL BEARINGS

The men who developed this marvel knew that every Bat had to hit its target. They designed special guiding mechanisms. They made them sturdy, trouble-free, delicately responsive. They mounted the moving parts in 36 BALL BEARINGS.

New Departure ball bearings can be mounted in any position. They hold moving parts precisely in place—with unchanging accuracy—under every kind of load. They move with less friction than any other type of anti-friction bearing.

In the Bat—and in many other kinds of mechanized war materiel—375 million New Departure ball bearings helped our fighting men.

Today, millions more of these precision-made ball bearings are helping America at peace. By increasing production—by cutting costs—by serving industry in every field.



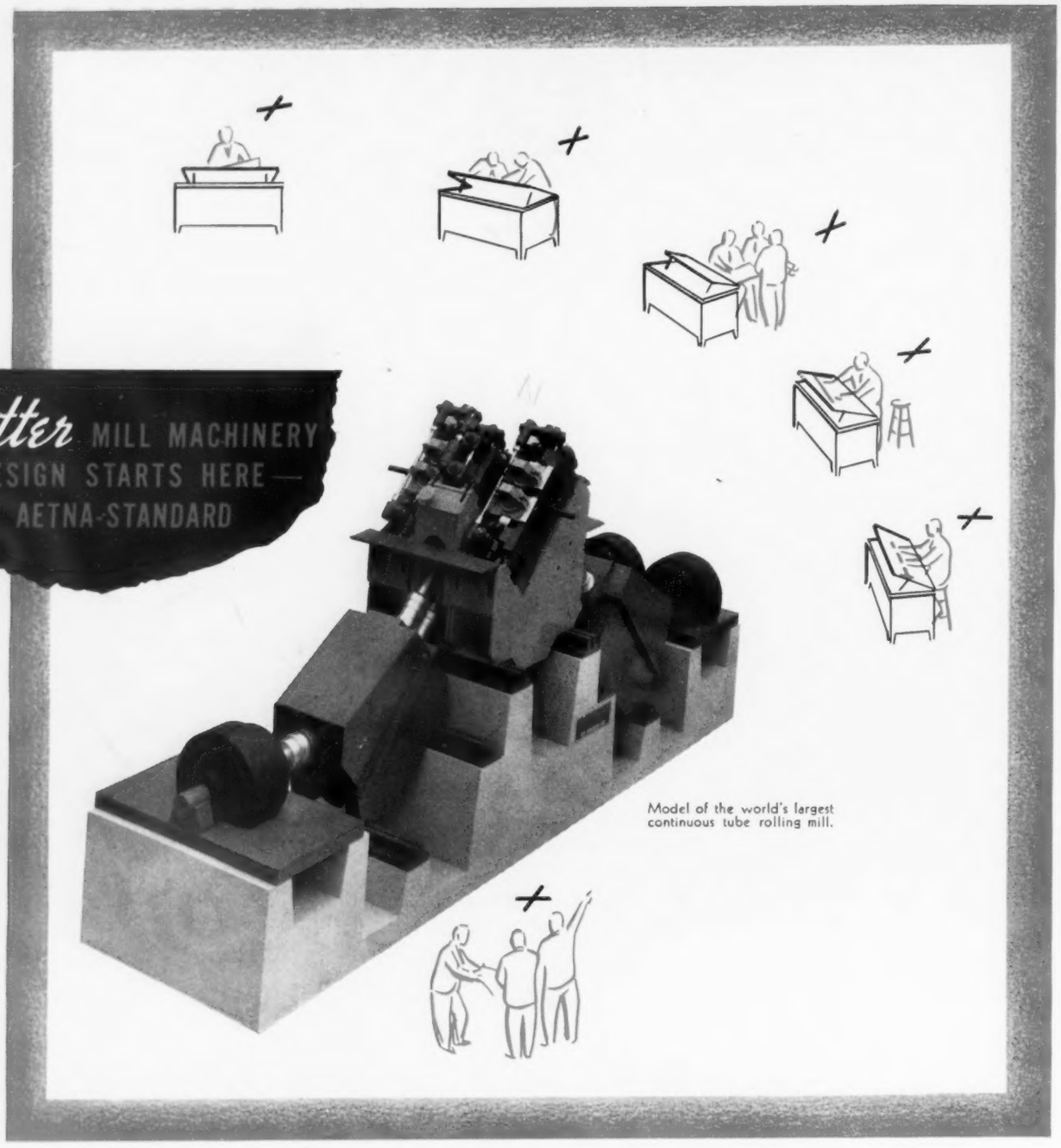
Automatically following every change in course of enemy ship—the Bat hits the target. First such weapon successfully used in combat by any nation. (*Sponsored by U. S. Navy Bureau of Ordnance and Bureau of Standards, the Bat is 12 feet long, has a 10-foot wing span. Official U. S. Navy photographs.)

nothing rolls like a ball

NEW DEPARTURE
forged steel
BALL BEARINGS

3460-R-1

NEW DEPARTURE • Division of GENERAL MOTORS • BRISTOL, CONN. • Branches in DETROIT • CHICAGO • and Other Principal Cities



Model of the world's largest continuous tube rolling mill.

For each group of mill products . . . flat-rolled, tubular, finishing, etc., Aetna-Standard has engineering and design specialists.

These men, together with executive engineers, devote a part of their talents and energies to the future . . . improving the efficiency of machines.

Many industry developments have originated with you, the customer, and the refinement of the ideas has been the result of close co-operation between the shirt-sleeve specialists of your company and Aetna-Standard.

Converting ideas into productive production to help you produce, form, and process steel, brass, copper, or aluminum efficiently, is the business of The Aetna-Standard Engineering Company.

Our products number into the hundreds under these major classifications: Seamless Tube Mills; Continuous Butt Weld Pipe Mills; Coating Equipment; Continuous Galvanizing and Tinning; Drawbenches; Rolling Mills; Flat-Rolled Finishing Equipment.

THE AETNA-STANDARD ENGINEERING COMPANY
YOUNGSTOWN, OHIO

ASSOCIATED COMPANY: HEAD, WRIGHTSON & COMPANY, LTD., MIDDLESBROUGH, ENGLAND

DESIGNERS AN
BUILDERS to th
Steel, Non-Fe
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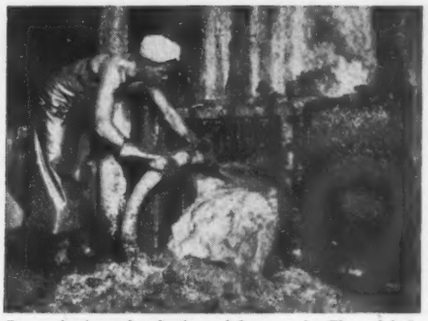
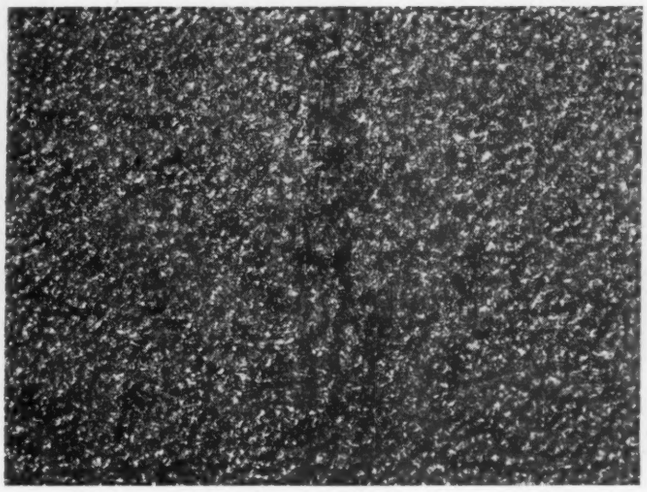
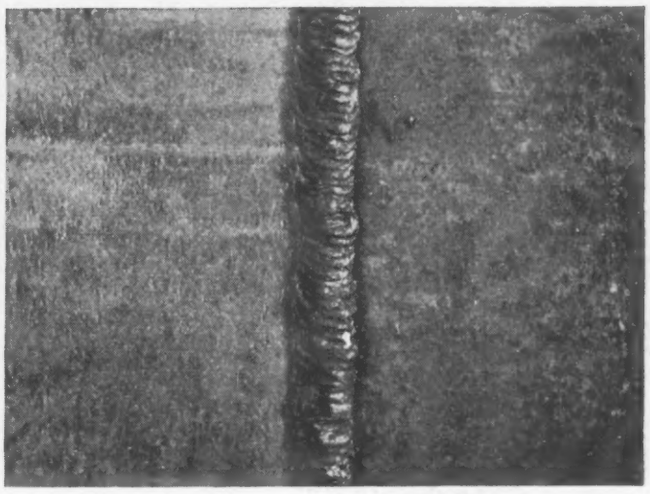


Removal of wood pulp from diffuser tank. The sulphide solution used in the digestion process is highly corrosive to ordinary carbon steel.

How would you have solved this corrosion problem?



Close-up showing condition of welded carbon steel plates inside pulp diffuser tank. Note the heavy corrosion resulting from the sulphide solution used in the wood-pulp digestion process.



Close-up showing condition of welded Mayari R plates inside pulp diffuser tank. The Mayari R shown above and the carbon steel plates shown at the left have been subjected to the same corrosive conditions.

Diffuser tanks in this paper plant were corroding at a costly rate due to the reaction with a sulphide solution used in the "cooking" of wood pulp.

Here is how the Chesapeake Corporation of West Point, Va., approached and solved this corrosion problem. In 1938 they contracted with Capital City Iron Works, Richmond, Va., to fabricate and install several diffuser tanks made of Mayari R corrosion-resisting steel along with several other tanks of ordinary carbon steel. By 1944, after identical usage, the carbon-steel tanks had corroded to the point where replacement was necessary, while the tanks of Mayari R remained in excellent condition. In fact the Mayari R tanks are still in use today.

This service-test in their own plant proved conclusively to Chesapeake Corporation that Mayari R has the corrosion-resistance they need for long-life, low-cost maintenance.

In addition to its corrosion-resistance Mayari R has high tensile strength. Its minimum yield point of 50,000 p.s.i. permits important savings in dead-weight as lighter sections of Mayari R can replace heavier sections of carbon steel without any sacrifice of strength.

Look into the advantages of using this modern low-alloy steel in your own equipment and products. Write today for the Mayari R catalog which contains detailed information about Mayari R and shows a wide range of industrial applications.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation

★ BETHLEHEM STEEL ★

Mayari R *makes it lighter... stronger... longer lasting*

ELECTRUNITE

MEET THE ELECTRU-KNIGHTS—six hard-to-please little guys, who, after careful deliberation, have unanimously agreed to put their stamp of approval on all products bearing the ELECTRUNITE trademark. Their motto: "Your choice is right, if it's ELECTRUNITE."

A WORD THAT MEANS *Electrically United*

Also means Quality Steel Tubing for Every Mechanical Application

Derived from two words, ELECTRically UNITed, the name ELECTRUNITE applies both to Republic's complete line of carbon, alloy and stainless steel tubing, and to the process by which they are manufactured.

The ELECTRUNITE process is the *original* process in which flat-rolled steel is accurately cold-formed into tubular shape and electrically welded into sound, dependable tubing.

From this proved method of tube manufacture come many of the money-saving qualities which you get in every length of ELECTRUNITE Mechanical Tubing—*strength, toughness, uniformly high ductility, smooth scale-free surfaces and trouble-free long life.*

Whatever the qualifications for your tubular products . . . structural strength . . . ease of fabrication . . . weldability . . . ability to take plated or painted finish . . . attractive appearance . . . you'll find the answer among the many sizes and grades of ELECTRUNITE Mechanical Tubing.

For the manufacturer not equipped to do his own fabricating, Steel and Tubes maintains an up-to-date, well equipped fabricating division. Complete information on request. Write to:

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION • CLEVELAND 8, OHIO
Export Department: Chrysler Building, New York 17, New York

Here are some samples—
Proof why we say . . .
"IT PAYS TO DESIGN THE ELECTRUNITE WAY!"

TYPICAL PARTS PRODUCED FROM ELECTRUNITE TUBING BY INDEPENDENT FABRICATORS

REPUBLIC STEEL

Republic
ELECTRUNITE TUBING
Reg. U. S. Pat Off

Behind the Scenes...

They're in a Lot of Woodpiles

Seems that we, as we suspected, are not alone in our complicated international problems. We refer, of course, to the Nigerian situation. All those friends of people in Lagos who have given their friends and the friends of all their friends our name have also given the names of dozens of other American businesses to their friends. At least that's what we gather from our mail, which has been rolling in from east and west. There must by now be quite a stock of American industrial catalogs in Nigeria. From the various letters we have learned that Lagos is a city of some 120,000 people; that these letters have been coming in for about four years now; that these people are variously considered to be students in a vocational school, a Nigerian English class, and a letter-writing club; that they are both male and female—one female told her correspondent here that she was a seamstress who needed a fountain pen and a Bible; and various other things of more or less interest. We don't believe we will send out any catalogs, and most of the other recipients of these letters have decided likewise, although nearly all of them sent catalogs in response to the first few letters received. Perhaps some day some American will go to Lagos and find out the whole story. We aren't going to undertake this job right now, what with world conditions so unsettled. On the other hand, one of our people suggested we might ease the maid situation considerably if we could import a few of these people, and maybe there are still fortunes to be made in that direction.

Q & A Dept.

Still comes the mail on the ladder-and-alley problem. Seems that the 26-odd foot answer is the right one, but one R. K. C. from Chicago claims it's only 20 feet wide, that the secret is that one of the buildings was constructed by an intoxicated bricklayer on a windy day and consequently it has a pronounced westerly list. Well, there may be something in what he says. At any rate, if you have been worrying about that hungry horse from last week, stop worrying. He has 18,593.03 square feet of grass to chomp up before going to work in the morning. That was a little tough, so this week we'll deal in a little easier one for the benefit of non-engineers like us, even. Seems that during the war a guy was working in a plant assembling ball bearings. There was a shortage of balls right then, and this guy was on piecework so he proceeded to gather in and hoard all the balls he could lay hands on. He piled them up in a secret location known only to himself, and then started to gloat over his forethought. He was trying to figure out how much kale he could salt away when he happened to think that he had forgotten to count the balls. He knew they were piled in a neat, rectangular pile with 600 on the bottom layer and 11 in the top row. How many did he have in the whole pile?

An Ear and a Prayer

This one comes from the *Postage Stamp:* Two gentlemen were kneeling side by side in the neighborhood church. One overheard the other praying for a Schnopper, and that he would give $500 for one. In answer to the prayer, the listening gentleman said he could get a genuine Schnopper, but that it would cost $650. The thankful gent said he would be glad to pay the price, handed over his card, arose, and walked out of the church. Then the prayer answering fellow knelt and said, "Please Lord, tell me: what is a Schnopper?"

Thus proving that there are usually answers to questions, but not always answers to answers.

Tear It Out & Send It In

Those of you who are confirmed readers of the back of the book will note a new service we've inaugurated this week in our Industrial Equipment section. Those two readers over in the corner who never get past the contents page will be interested too, so listen in! For some years now we've been putting a free-for-nothing return coupon on the New Literature page so you can check off the items of interest and have the manufacturers send you a copy. Now we're doing the same deal on equipment, for your convenience. If you want more information than we're able to squeeze into our limited space, just circle the proper number, tear off the coupon, and drop it into the nearest mailbox. We'll do the rest, post haste.

Shrdlu

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STEEL

Vol. 120—No. 6 February 10, 1947

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Editorial Staff on Contents Page

RAMSET

SUCCESSOR TO B.R.I. PRODUCTS

RAMIX AND 695 PLASTIC

Ramset is a multi-purpose basic refractory, designed to meet the demands of the operator who is striving for increased production of quality steel at lower cost.

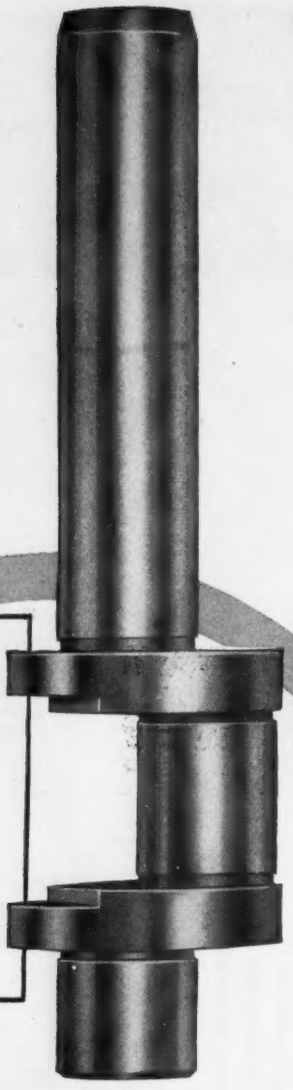
The improved refractory provides important advantages for new hearth construction over Ramix, the original cold ramming refractory now in use in hundreds of basic open hearth and electric furnaces. Ramset is equally effective for hot or cold hearth repairs and for other applications in which 695 Plastic has proved satisfactory.

BASIC REFRACTORIES, INCORPORATED

845 HANNA BUILDING
Cleveland 15, Ohio

Exclusive Agents in Canada: **REFRACTORIES ENGINEERING AND SUPPLIES, LTD., Hamilton and Montreal**

2 MACHINES INSTEAD OF 4



THE crankshaft illustrated (full size) is produced by a leading manufacturer and is typical of scores of such parts being turned out throughout the nation.

The accepted procedure is to cut bar stock to length on a cut-off machine, and perform the other operations on three chucking machines . . . a relatively slow, costly procedure.

New Britain engineers proposed a complete departure: The long end is turned and the short end formed on a New Britain Six-Spindle Automatic Screw Machine. All the remaining cuts are accomplished on one New Britain Six-Spindle Automatic Chucking Machine. The same number of cuts — the same finish — with two machines instead of four. The savings in time, labor and machines are spectacular.

Lower production costs are the one key to more sales, more jobs, more prosperity. New Britain Machines and progressive New Britain research and engineering have teamed to make *New Britain* a by-word for *production* since the earliest days of modern machine tools. They stand ready to serve you and your business.

New Britain
Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

ENGINEERING DETAILS

With the use of eccentric collets, the shank end and out-board support diameter are turned to grinding size and the piece cut off.

On the second operation, on a New Britain tooled as a chucker, and again using eccentric collets, the crank pin diameter is formed and the two shoulders of the crank shaft throw are faced.

Previous experience in machining this part revealed that the throws of the crank pin had a tendency to spread when the metal was removed. This difficulty is overcome by forming in successive steps down to the crank pin diameter and finally taking a light finish facing cut on each throw of the crankshaft. Parallelism between the center lines of both ends of the main shaft and the crank pin are thus held within the desired tolerance.

M-01053

(Reproduction of advertisement appearing in Fortune Magazine)

for THE MEN WHO "Button Up" THE SINEWS OF INDUSTRY

To men on location who must rivet or weld the sinews of industry according to details of the building layout, Allied offers help, as well as to the architects and engineers who design the structures.

Many fabricating and erection short-cuts have been learned during war years, and Allied engineers are glad to co-operate in interpreting plans quickly and in super-fast assembly of precision units fabricated for the job.

This Allied experience working in harmony with contractors and engineers can but result in economies wherever steel structures rise. Let Allied team with you in fabricating and erecting the steel for your buildings.

ALLIED STRUCTURAL STEEL COMPANIES

ENGINEERS
FABRICATORS (75,000 TONS CAPACITY)
ERECTORS

- CLINTON BRIDGE WORKS, 101 S. Second St. Clinton, Iowa
- GAGE STRUCTURAL STEEL CO., 3123-41 S. Hoyne Ave., Chicago 8, Ill.
- MIDLAND STRUCTURAL STEEL CO., 1300-20 S. 54th Ave., Cicero 50, Ill.

Part is a tread pin, 18 in. long by 1⅜-in. dia. Material is SAE-1045 cold-rolled steel. Requirements are 50-55 Rockwell "C" at surface, ⅛-in. depth of case, without changing core structure.

ONE 18" PIN EVERY 3 MIN.

SURFACE HARDENED TO 52 R "C" by High-Frequency Heating

This tread pin is an example of one advantage of high-frequency heating—obtaining a uniformly hard surface and ductile core without resorting to alloy steel or carburizing.

Pins are progressively surface hardened to 1/8-inch depth at 6 inches per minute while rotated at 30 rpm. Surface is heated to 1550°F and immediately water quenched.

A surface hardness of 52 to 55 Rockwell "C" is obtained, while core remains at approximately 20. Warpage, over the 18 inches, is 1/32 inch or less. No finishing is required because of negligible scale. Working conditions are clean and cool, and since operation is automatic, an unskilled operator can produce excellent and uniform results.

The heating coil was developed by Lepel Laboratories for use with a 30-kw spark-gap converter. Manufacturer developed the motor-driven carriage, mounted on a Lepel quench tank, which provides the progressive feeding and rotation of the pin.

SOLDERING
BRAZING
HARDENING
ANNEALING
MELTING

The same Lepel Spark-gap Converter will handle any or all of these processes, usually with advantages similar to those given in this advertisement. Often this unit will prove substantially more economical than any other high-frequency generator—*particularly when heating non-ferrous or non-magnetic materials.* Changing from one job to another can be done in less than 5 minutes.

If you have any operation—on ferrous or non-ferrous *materials—which you suspect can be handled by high-frequency heating, let us make a preliminary check. If at all promising, our engineers can run tests, on samples you supply, and report just what can be done. There is no obligation; inquiries are treated with strictest confidence.*

A letter to us will bring you, as you prefer, more information or a call by a representative. Any description of part or process may enable us to furnish, immediately, specific helpful data. You can help us by mentioning this advertisement.

HARDEN

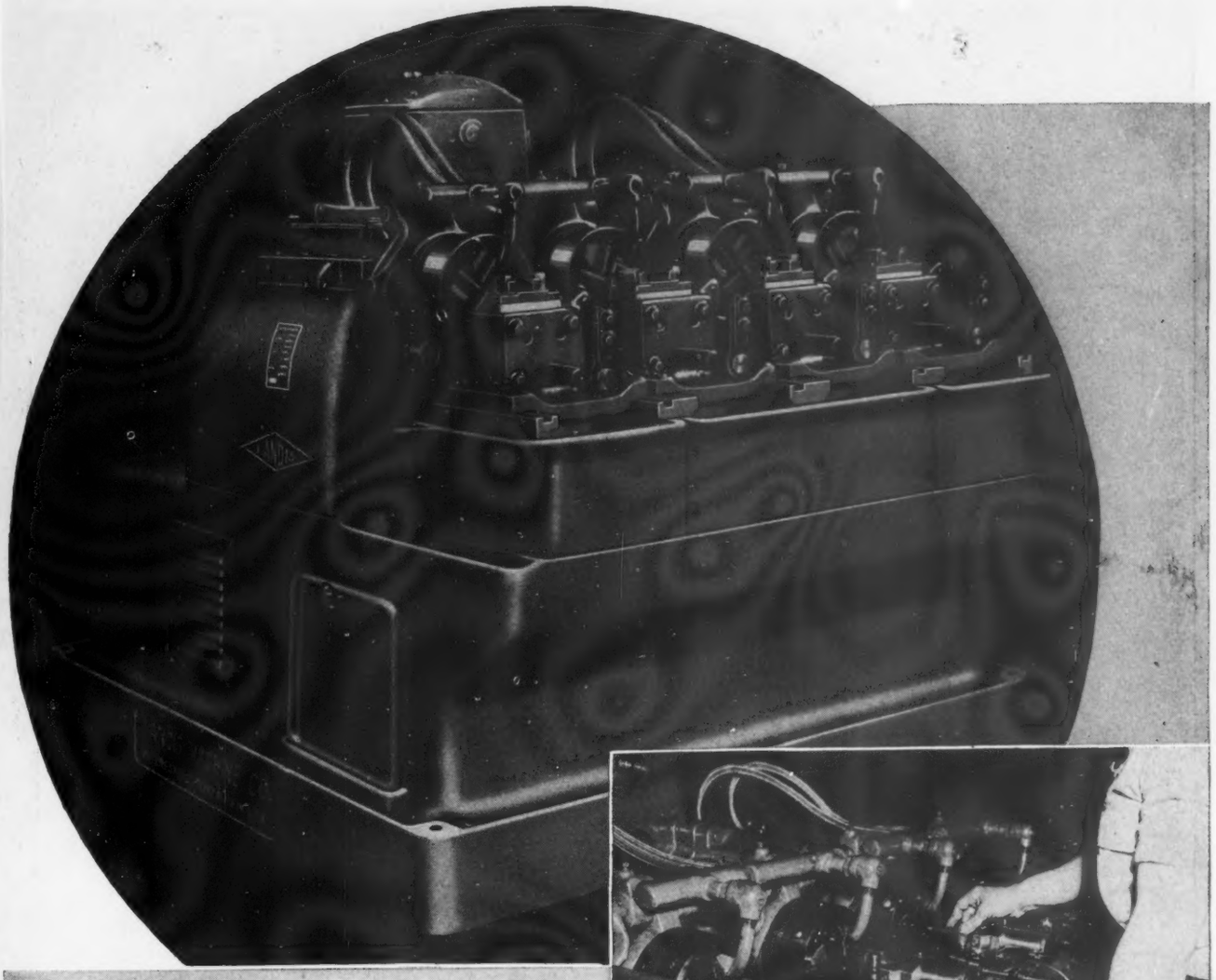
SOLDER

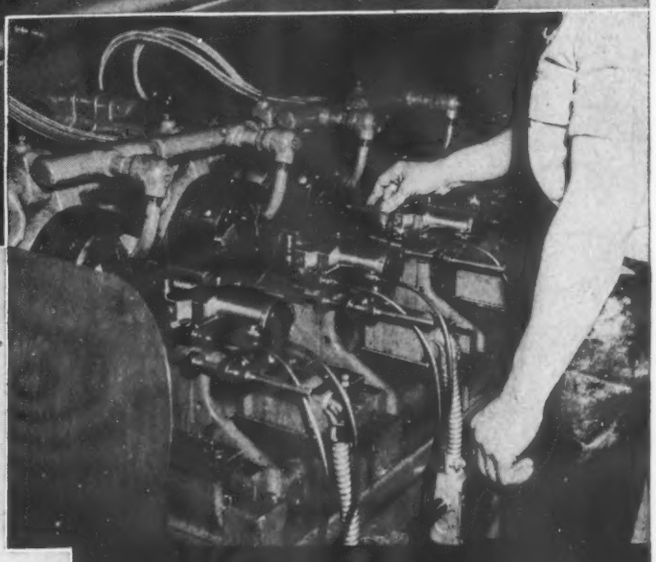
BRAZE

MELT

LEPEL HIGH FREQUENCY LABORATORIES
39 WEST 60th STREET, NEW YORK 23, N. Y.

Lepel
HIGH-FREQUENCY HEATING UNITS





LANDIS 4 Spindle

SEMI-AUTOMATIC THREADING MACHINE

The Landis 4 Spindle Semi-Automatic Threading Machine is a precision machine designed for threading automotive parts, bolts, studs, rods, etc., on a high production basis.

Due to exclusive features in design it offers an unusually high percentage of efficiency.

Outstanding advantages are: High Production with Low Threading Speeds, Quick Set-Ups, Flexibility for all Diameters and for Special Threading Operations, Elimination of Side Shave at Start of Thread, and Thread Concentricity.

Write for Bulletin E-88

LANDIS MACHINE *Company*

WAYNESBORO, PA.

Beautiful music to a cost man's ears

Maybe you are unaware of profit leaks creeping into your plant through low production rates and excessive wheel replacements.

A new note of gladness will strike a responsive chord with your cost man when he sees the savings after a shift to job-designed Peninsular grinding wheels.

Peninsular engineers have specialized in such savings since 1889 and are available for a careful study of your grinding operations. They can show the way to substantial cost reductions through a change-over to wheels specially designed for your work. They make a complete analysis of your equipment, of the material to be ground, and of all other important factors that influence costs.

Their findings are used to develop a special formula and the proper shape for grinding wheels that are most efficient for your work. *Every* Peninsular grinding wheel is specially made for its particular job.

The Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Newark, Pittsburgh, Houston, St. Louis, Cincinnati.

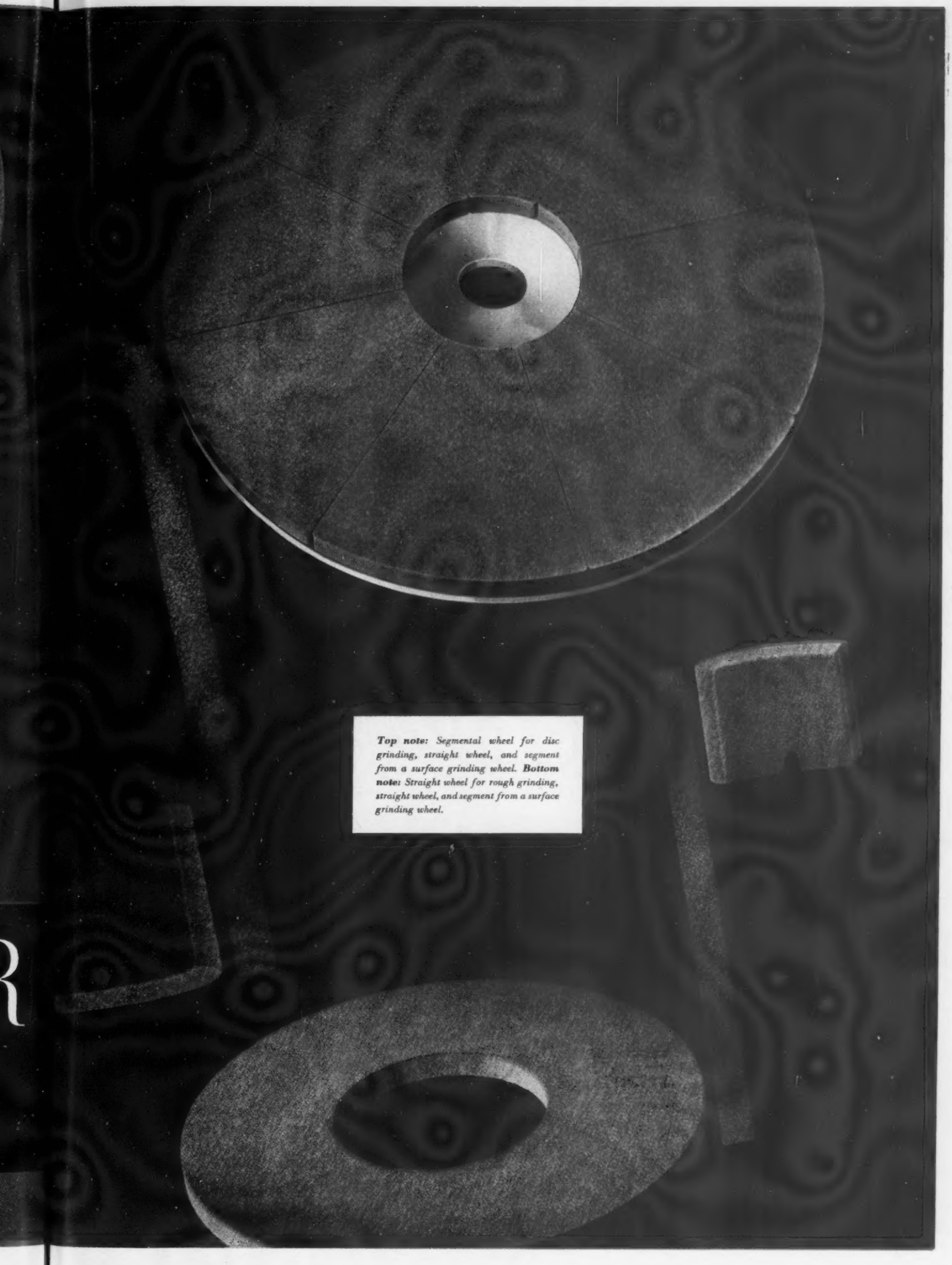
PENINSULAR

INDIVIDUALLY PENINSULAR *ENGINEERED*

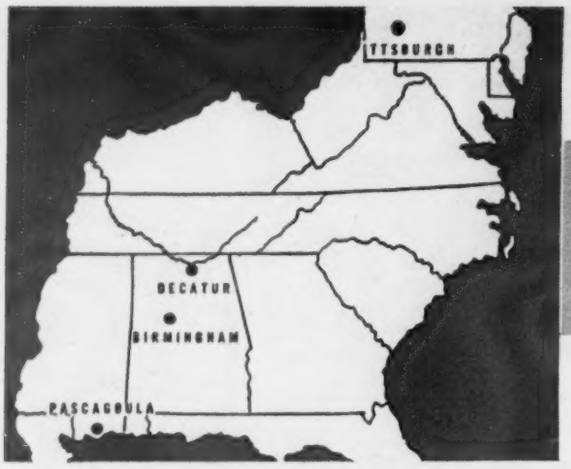
GRINDING WHEELS

SINCE 1889

SPECIALISTS IN RESINOID BONDED WHEELS



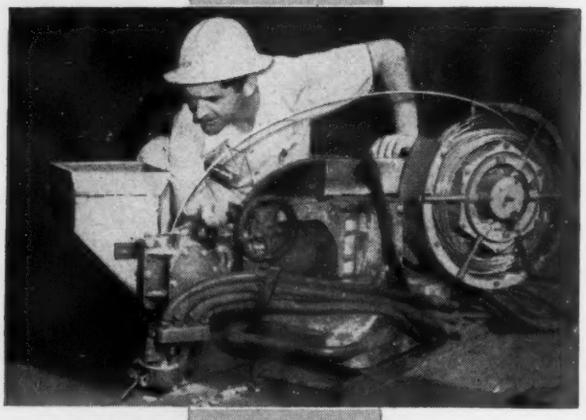
Top note: *Segmental wheel for disc grinding, straight wheel, and segment from a surface grinding wheel.* ***Bottom note:*** *Straight wheel for rough grinding, straight wheel, and segment from a surface grinding wheel.*



STRATEGIC PLANT LOCATIONS

AMPLE FACILITIES

What's Behind INGALLS STEEL



ADVANCED METHODS

WIDE EXPERIENCE

COMPLETE ERECTING SERVICE

CONSULT INGALLS

Fabricators—Engineers—Erectors

THE INGALLS IRON WORKS COMPANY, THE INGALLS SHIPBUILDING CORPORATION, The Steel Construction Company, Birmingham Tank Company. Offices at BIRMINGHAM, New York, Pittsburgh and New Orleans. Fabricating plants at Birmingham and Pittsburgh. Shipyards at Pascagoula, Mississippi, and Decatur, Alabama.

PROTECTION

WHERE NEEDED

H-722 . . . Men's Russet Glove, Lace-to-Toe Blucher. Composition Cord sole, rubber heel. Widths C-D-E, sizes to 13.

. . . Insure Workers Feet In Sure Protection with HY-TEST Safety Shoes

Each worker is his own goalie when the puck of fate, ACCIDENT, heads his way. And it's protection well placed when he's wearing Hy-Test Safety Shoes. The built-in *Anchor-Flange** Steel Box Toe stops accidents in their tracks. . . prevents many painful, costly injuries. All leather in vital parts, Hy-Test Safety Shoes wear longer. They're more comfortable . . . keep feet feeling fresher while keeping toes safer. Sizes are 5 to 15 in widths AA to EEE.

*ANCHOR FLANGE STEEL BOX TOE

This flange adds extra strength to the steel arch's sidewall. Anchored between insole and outsole, it also serves to resist shifting, tilting, and cutting through outsole under impact.

HY-TEST Safety Shoes

THE WORLD'S LARGEST SELLING SAFETY SHOE

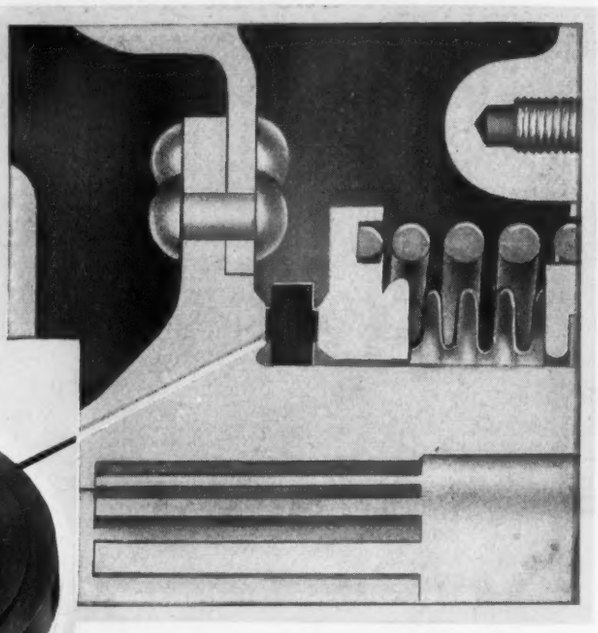
HY-TEST DIVISION • INTERNATIONAL SHOE COMPANY • ST. LOUIS 3, MISSOURI • EASTERN OFFICE • MANCHESTER, N. H.

graphitar seal helps

(CARBON-GRAPHITE)

# of gyrol fluid drive unit

AMERICAN BLOWER CORPORATION USES GRAPHITAR SEALS TO INSURE DEPENDABLE PERFORMANCE OF GYROL FLUID DRIVE.



A small Graphitar seal, lapped flat to within 35 millionths inches, helps to produce the dependable performance of the Gyrol Fluid Drive manufactured by American Blower Corp. Installed as shown, the Graphitar seal floats free, seals with no leakage whatsoever, and requires no lubrication because its carbon-graphite composition is self-lubricating. This seal, like all Graphitar parts, affords maximum resistance to friction and wear, it is mechanically strong and it is unaffected by chemical attack and sudden and extreme temperature changes. In similar installations, Graphitar seals assure efficient sealing where operating conditions include pressures up to 60 lb./sq. in. at 350°F. and 1000 ft./min., and temperatures up to 550°F.

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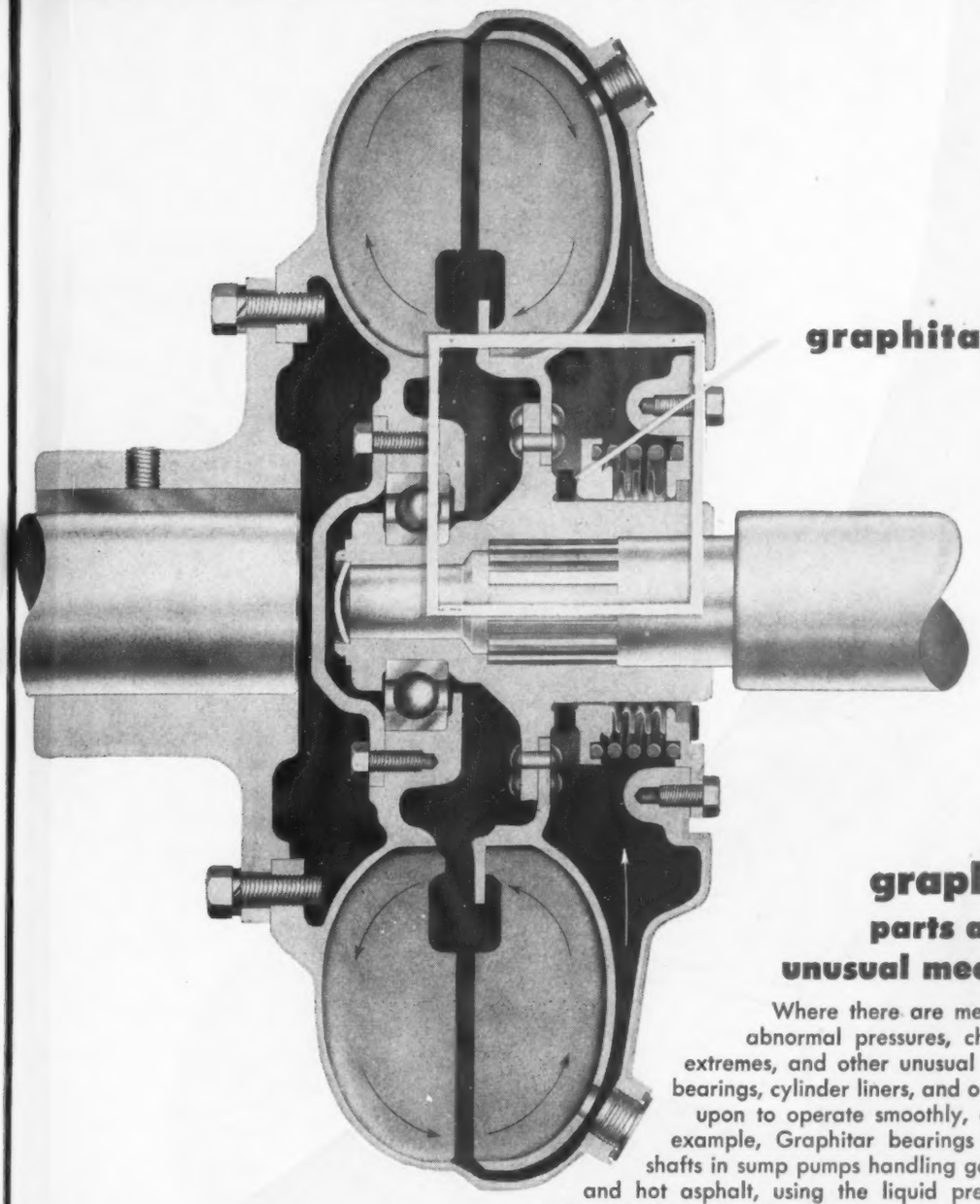
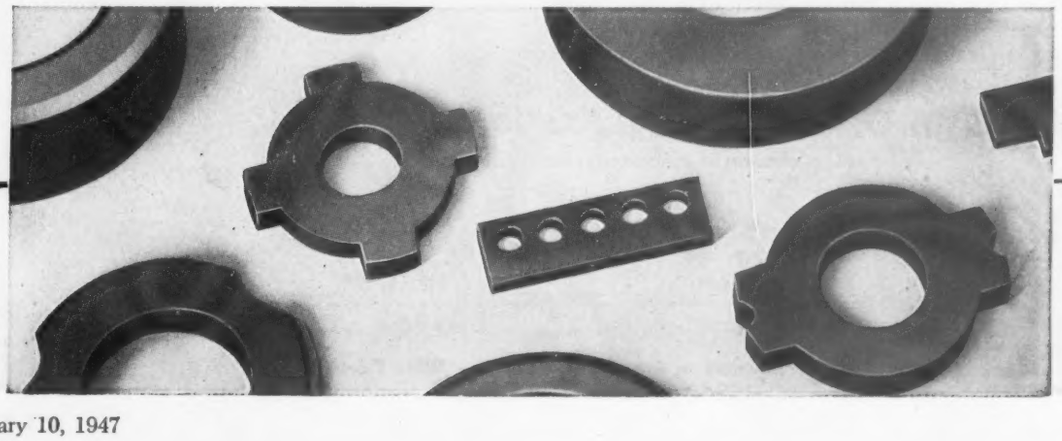


graphitar seal

graphitar

parts are made to meet unusual mechanical demands

Where there are mechanical problems involving abnormal pressures, chemical attack, temperature extremes, and other unusual conditions, Graphitar seals, bearings, cylinder liners, and other parts may be depended upon to operate smoothly, efficiently, and quietly. For example, Graphitar bearings align and support vertical shafts in sump pumps handling gasoline, alcohol, molten salt, and hot asphalt, using the liquid present as lubricant to insure dependable pumping at pressures up to 200 psi, temperatures to 1000°F., and speeds to 1200 ft./min. The successful applications of Graphitar, in various shapes and with close tolerance dimensions, are too numerous to list—but, if you will send us sketches or descriptions of your products our engineers will be glad to show you where Graphitar parts will improve mechanical performance and save you money. Ask for 44-page catalog.



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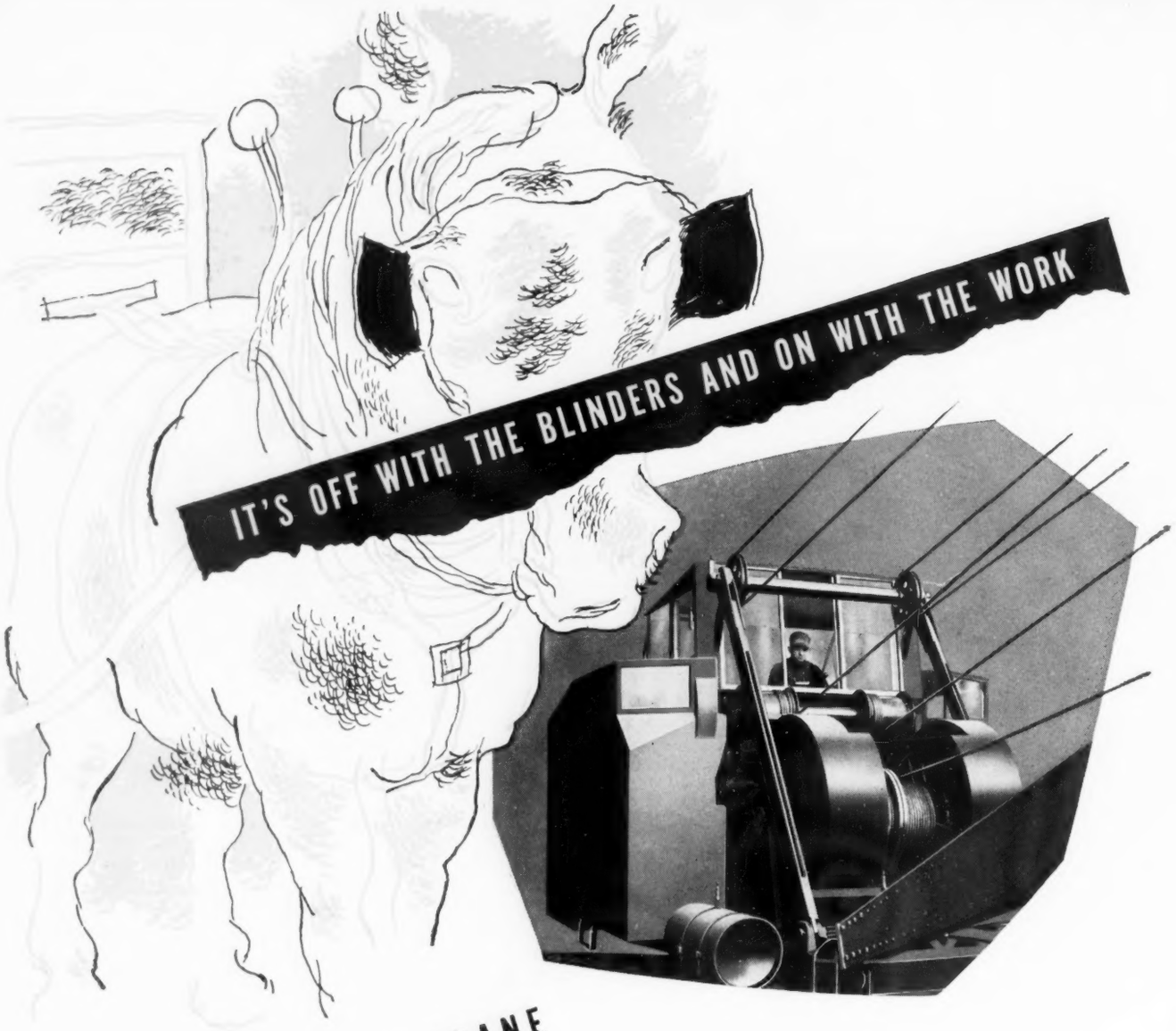

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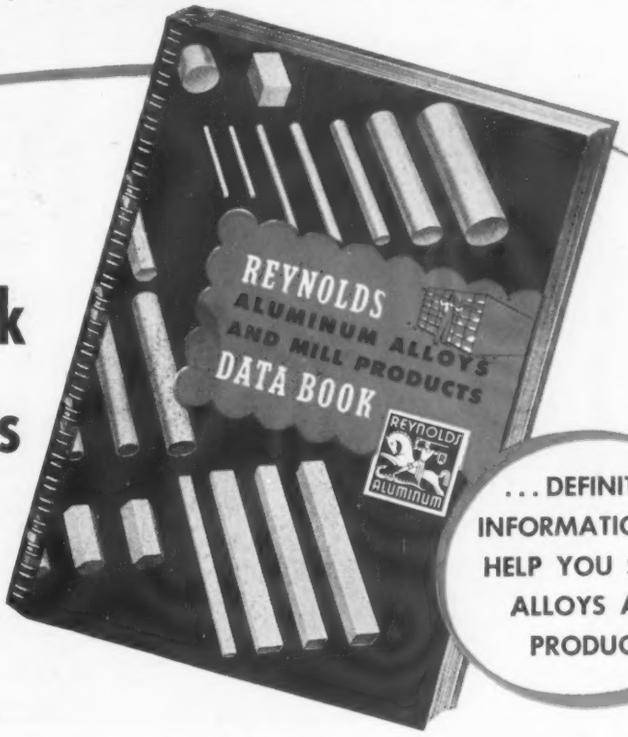

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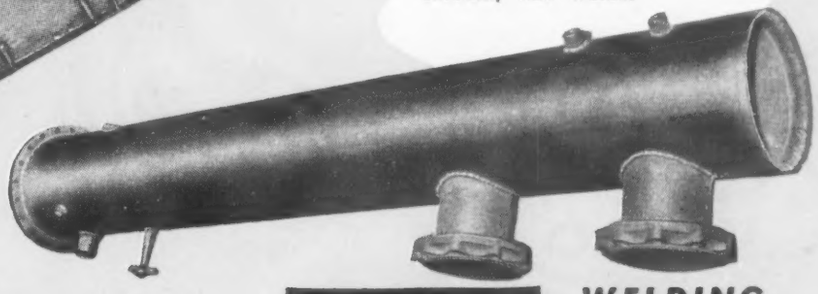

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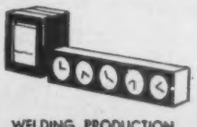

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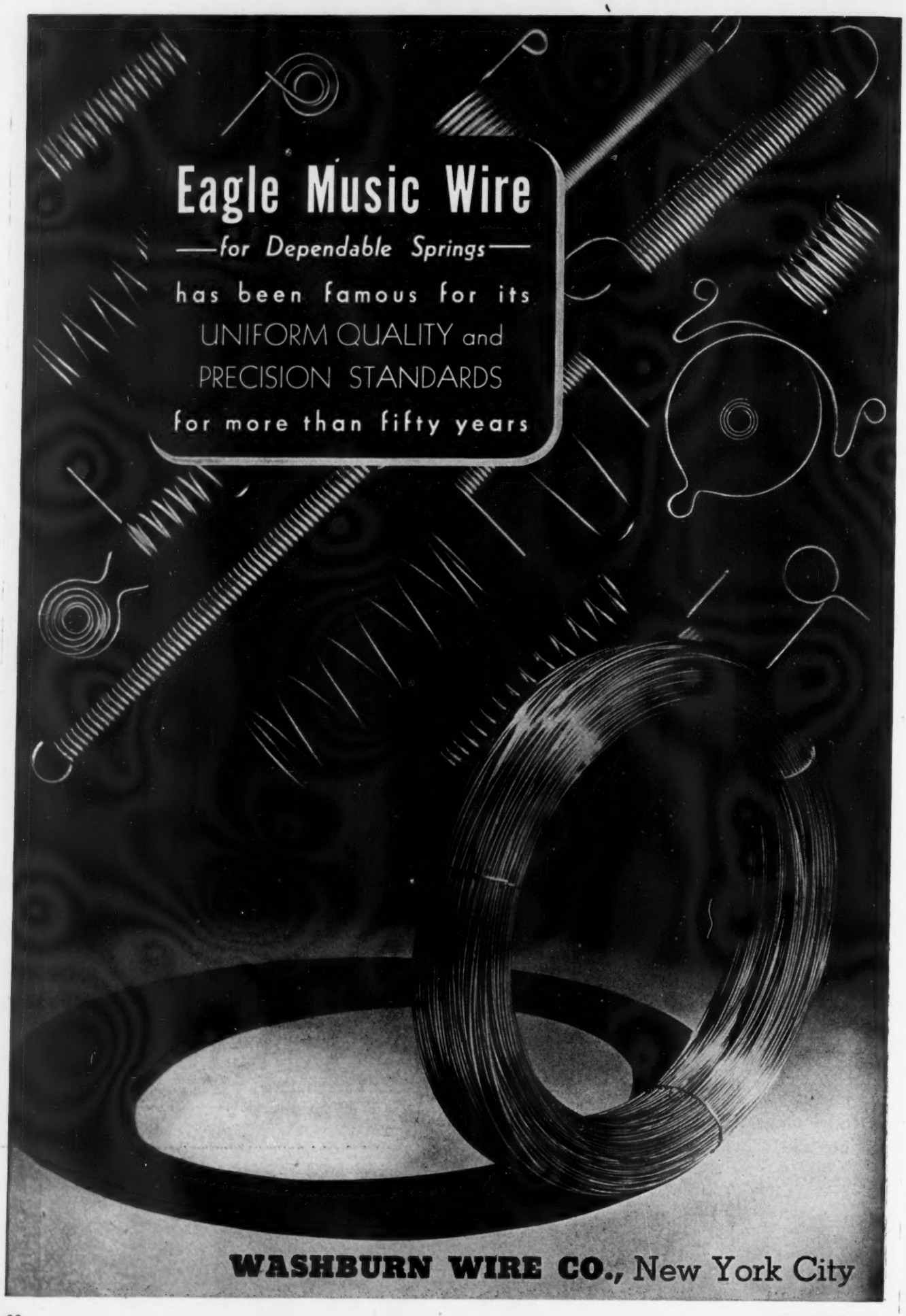
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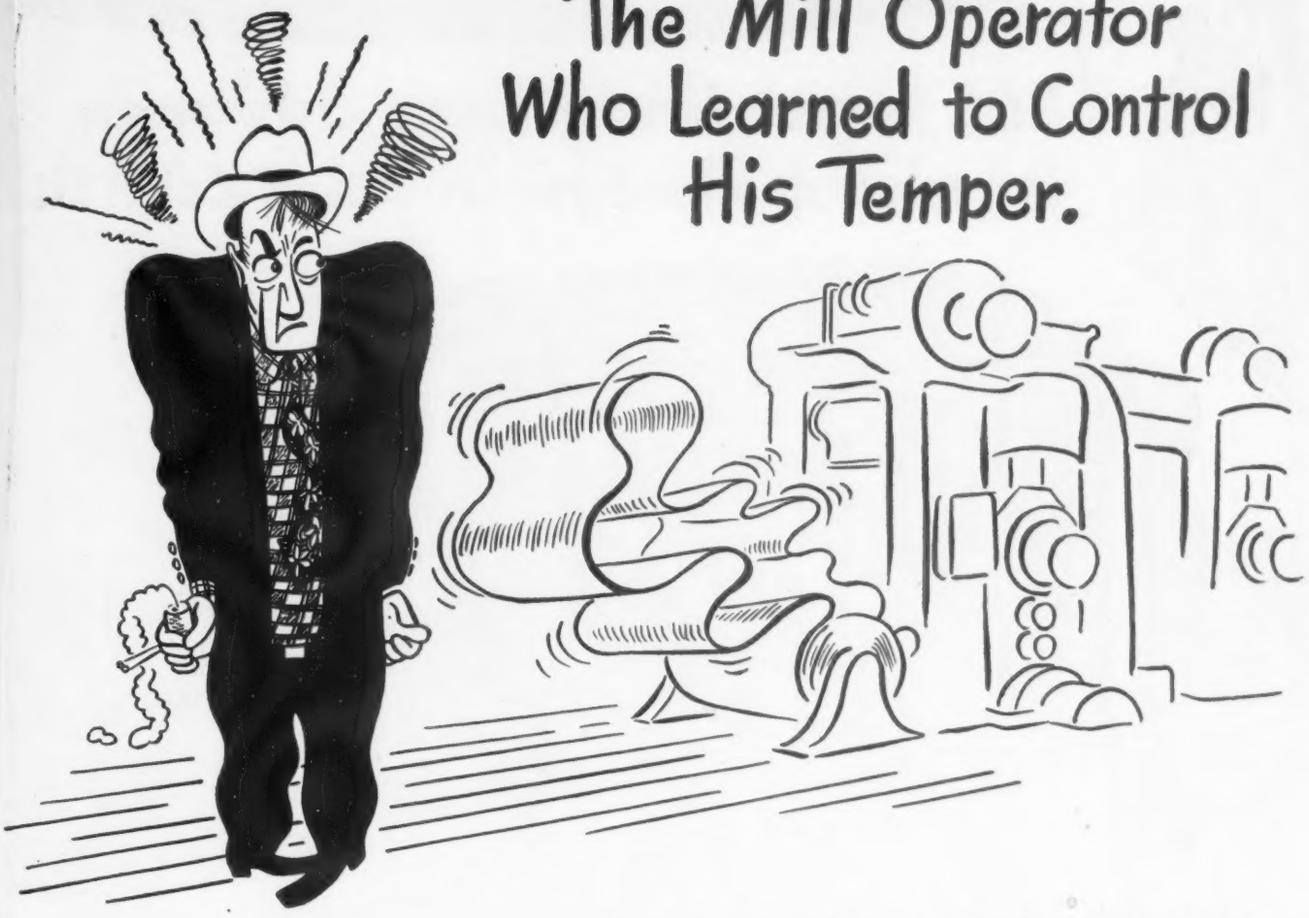
The Mill Operator Who Learned to Control His Temper.



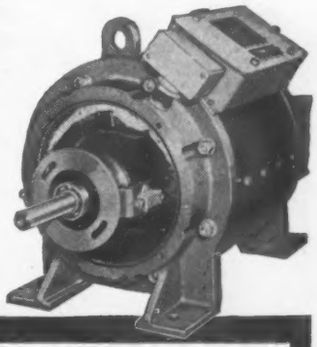
FEW THINGS ARE HARDER on the temper of a steel mill operator than time lost due to a "cobble" while rolling steel. And similarly, nothing is so hard on the temper of *steel* as rolling under *uneven tension.*

A wise operator learned to control both his own temper and that of his steel by installing accurate "Regulex" control on his temper mill. Through close control of strip tension during all the stages of reel build-up, from stand-still . . . to top speed . . . to deceleration, "Regulex" control helped him produce tempered steel of superior quality, as well as a compact, evenly-wound coil.

Moreover, the operator found that when he replaced old-type equipment with high speed "Regulex" control, he actually *doubled* the daily capacity of his mill!

MORAL: Modern "Regulex" control has wide application in steel plants . . . wherever rapid adjustments are needed in torque, tension, speed, current, or any other variable which can be measured electrically. By its fast response, without overshooting, it helps increase production, save money, protect machines. "Regulex" control systems involve fewer contactors, no trick circuits . . . machines themselves are simple and rugged.

For the full story on "Regulex" control, see our nearby sales office, or write ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN. A 2078



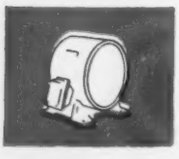
ALLIS CHALMERS **REGULEX CONTROL** *"The Educated Generator"*

The most important advance in motor design in 58 YEARS...

Features and improvements demanded most by users ALL WRAPPED IN A SINGLE PACKAGE

When Westinghouse engineers began designing a postwar motor they abandoned the concept that all motors must be cousins. Instead, they asked electric motor users *what they wanted* in motors . . . features they couldn't buy in any one motor.

These features demanded most by motor users are *all* incorporated in the new Life-Line Motors:



ALL-STEEL PROTECTION. All frames, feet and brackets are HEAVY STEEL. Life-Line Motor stators are far stronger—a new core locking device eliminates rivets.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

the New WESTINGHOUSE Life-Line MOTOR

It's completely new . . . it's completely different . . . it wraps up the advances made in "custom-built" wartime motors in a single package!

For 58 years, induction motors have been built fundamentally alike. Differences have been minor . . . improvements gradual. Today, in the new Life-Line, Westinghouse presents a major departure from accepted ideas of standard-motor limitations.

Life-Line, today, offers industry a truly all-steel protected motor. All exposed surfaces are HEAVY STEEL—frames of even the smallest sizes are $\frac{3}{8}$" thick.

More compact power is packed in Life-Line. For example, on the 284 frame, size has been reduced 35%, although NEMA mounting dimensions have been maintained . . . starting torques are as much as 134% greater per pound of motor . . . maximum torques as much as 116% more per pound.

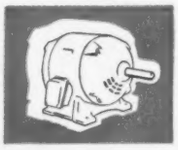
Electrical characteristics have been improved . . . new materials and new winding techniques give increased protection against electrical failure. And sealed, pre-lubricated bearings do away with need for greasing or attention for at least five years!

The Life-Line Motor, as a result, represents the biggest single step forward in design and construction since the invention of the electric motor 58 years ago. Life-Line Motors are now reaching the drives of industry by the thousands, but are not yet available in quantities to meet the unprecedented demand. So, look over Life-Line advantages now with an eye to your future requirements. Your local Westinghouse office can give you full details, or write to Westinghouse Electric Corporation, P. O. Box 2025, Buffalo 5, N. Y.

★ ★ ★

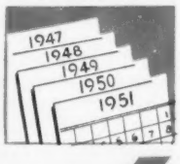
Life-Line Motors are now in production at the new Westinghouse Motor Works in Buffalo, N. Y. This plant is laid out, tooled and equipped to fully utilize newly developed production processes and techniques on a scale hitherto unequalled in the manufacture of electrical motors.

J-21406



LESS SPACE PER HP. Life-Line Motors occupy less space per horsepower than any other standard motor . . . making it easier to build into machines and install in cramped quarters.

MORE TORQUE PER LB. Life-Line Motors give as much as 134% higher starting torque per pound of motor . . . up to 116% higher maximum torque.



NO LUBRICATION FOR 5 YEARS. Life-Line Motors need no greasing for AT LEAST FIVE YEARS. Bearings are pre-lubricated . . . sealed against dirt and moisture.

IMPROVED WINDINGS. New insulating materials . . . new coil winding techniques . . . new stator slot designs . . . give the Life-Line new record-setting protection against electrical failures.

NEW QUIET SMOOTHNESS. Life-Line Motors cut vibration and noise to new low limits for standard motors . . . satisfy many "special motor" requirements.

NEW SLEEK LINES. The Life-Line has sleek lines . . . a smooth finish . . . discourages dust and dirt accumulations . . . harmonizes with modern machine and tool design.

Life-Line motors

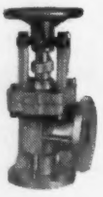
Go "National" for Lead VALVES

What kind of Acid Valve do you need?

1 "United" Type R Valve? This ingenious valve, recently introduced by National Lead, offers advantages unobtainable with valves whose body and seat are cast as an integral unit. Because of its split-body construction it can be installed either as a "Y" or Angle pattern. All you do is reverse the position of the body section, as shown in the illustrations below. Thus, your supply stock can be held to a minimum by standardizing on *one* valve with *two* uses. Another feature is the removable seat and plug disc. Both can be replaced easily at nominal cost. Finally, seat and plug can be supplied in any alloy or material you specify. For normal applications, the valve is furnished in three standard ways: 1. Lead plug disc and stem integral; 2. Removable lead plug disc; 3. Removable rubber plug disc.

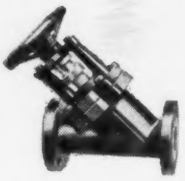
Two valves in one! *Simply reverse the position of the body sections and the "United" Type R Valve is changed from a "Y" pattern to an Angle pattern. Available in hard lead or lead-lined cast iron or cast steel.*

2 "United" Chem-Rayon Valve? This valve is manufactured in both "Y" and Angle design. The body is cast hard lead. Fins of the same metal reinforce and greatly increase the strength of body and flanges, while holding weight to a minimum. The stuffing box is of exceptional depth. Packing can be replaced under pressure. Steel and bronze bonnet are completely covered (except wheel and bushing) with hard lead. Available with removable plug discs of rubber or lead.

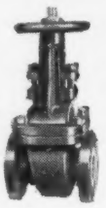


We also supply check, foot and diaphram valves in hard lead, cast iron, and cast steel lead lined.

3 "United" Type C Valve? The important difference between this type and the "United" Chem-Rayon valve is in the materials used for the body and bonnet. In the Type C valve these are made of cast carbon steel or cast iron heavily lined with lead. Furthermore, the body is cast oversize in order to allow a full flow area after lining. All parts of the two valves are interchangeable. Available in both "Y" and Angle patterns.



4 "United" Gate Pattern Valve? This is a most efficient gate valve, available with body and bonnet in hard lead, lead-lined cast steel or lead-lined cast iron. It is designed for use wherever an absolutely drip-proof acid valve is a "must." The seat is hard lead, cast integral with the body lining. This valve can be furnished with disc made of acid-resisting rubber, bakelite, or special alloys as required. You get a satisfactory seal at all times.



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National Lead is ready to consult with you and supply any type of lead pipe . . . valves . . . sheet . . . lead-lined or lead-covered equipment . . . even complete acid recovery plants. And behind every National Lead product, every National Lead recommendation, are years of experience and many important installations in every field handling corrosive liquids and gases.

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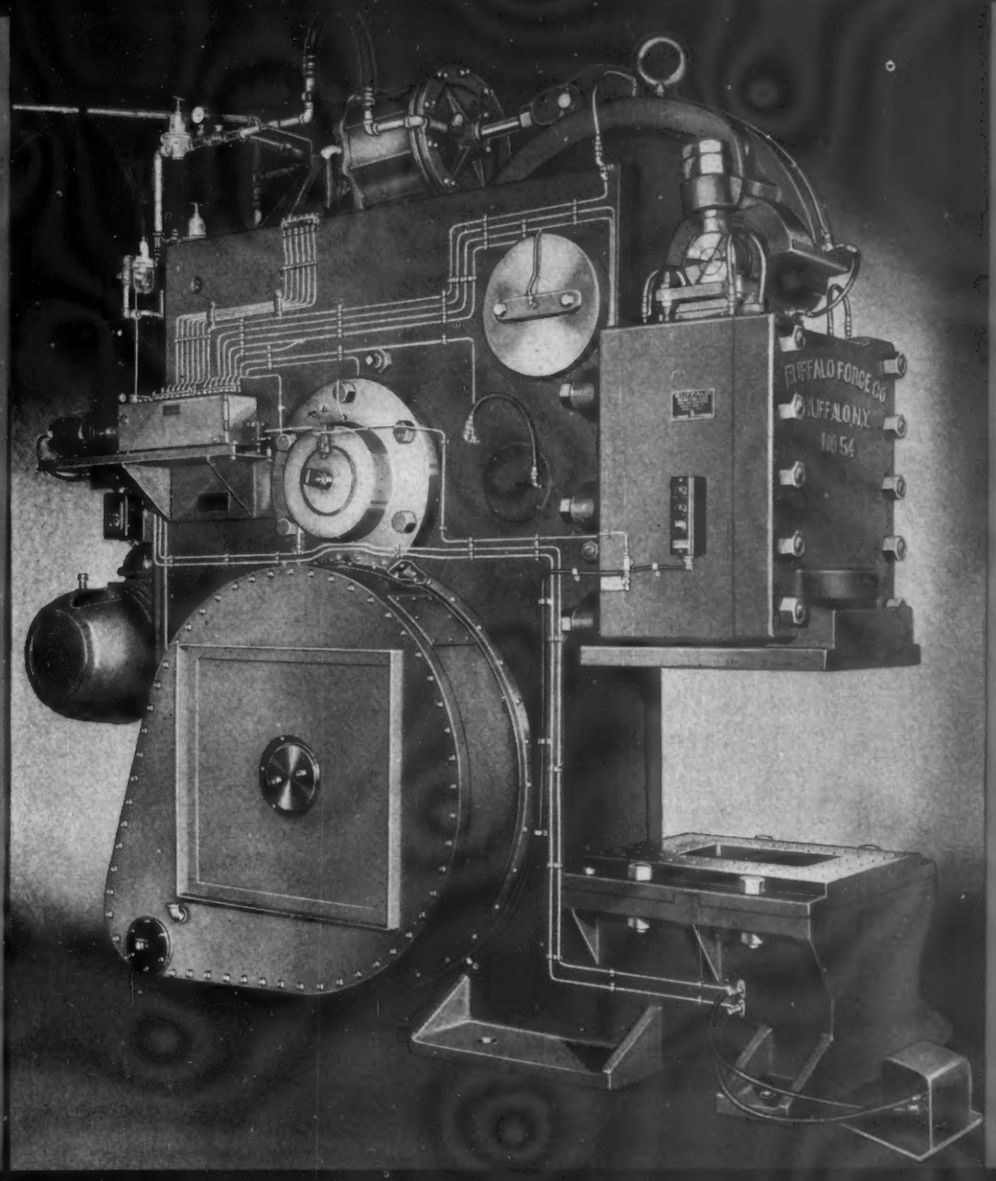

35 strokes a minute, at 315 tons capacity! This Buffalo No. 54 Mill Type Shear has a 4" stroke, electrical forward-stop-and-jog controls, air counter-balanced for plunger, air clutch and herringbone gears running in oil.

for HEAVIER DUTY
punching, shearing, blanking

The BUFFALO Mill Type Line of shears offers to the heavy industries many features not found in standard lines of shearing machines:

1. Heavier construction
2. Longer power strokes
3. Greater tonnage capacities
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5. Variety of plunger engagements for different services.
6. Twelve sizes, 250 to 1200 ton capacities.

SIMPLY WRITE US for all details of construction, attachments, stroke lengths, applications, etc.

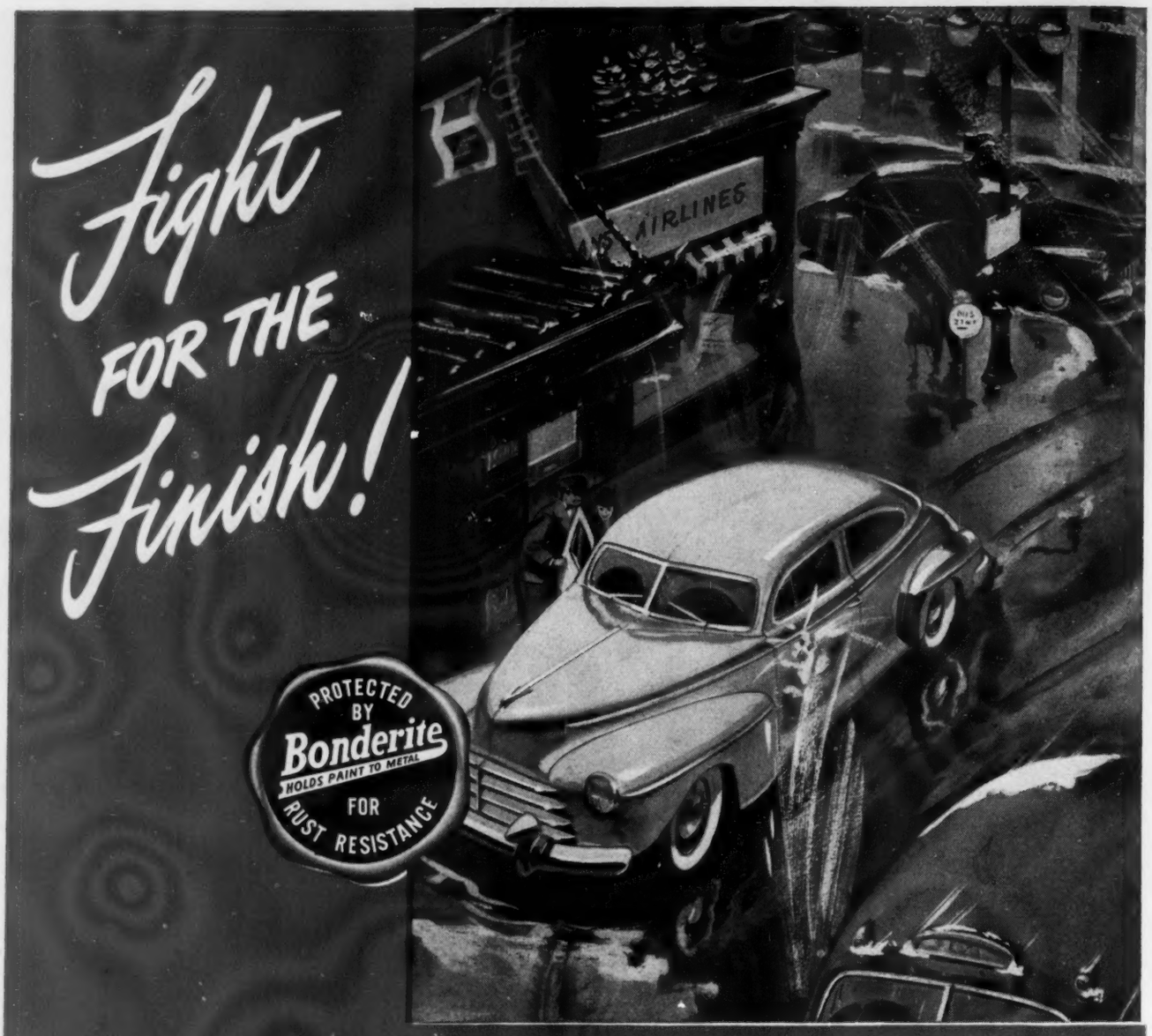
BUFFALO FORGE COMPANY

158 MORTIMER STREET **BUFFALO, N. Y.**

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

MILL TYPE SHEARS



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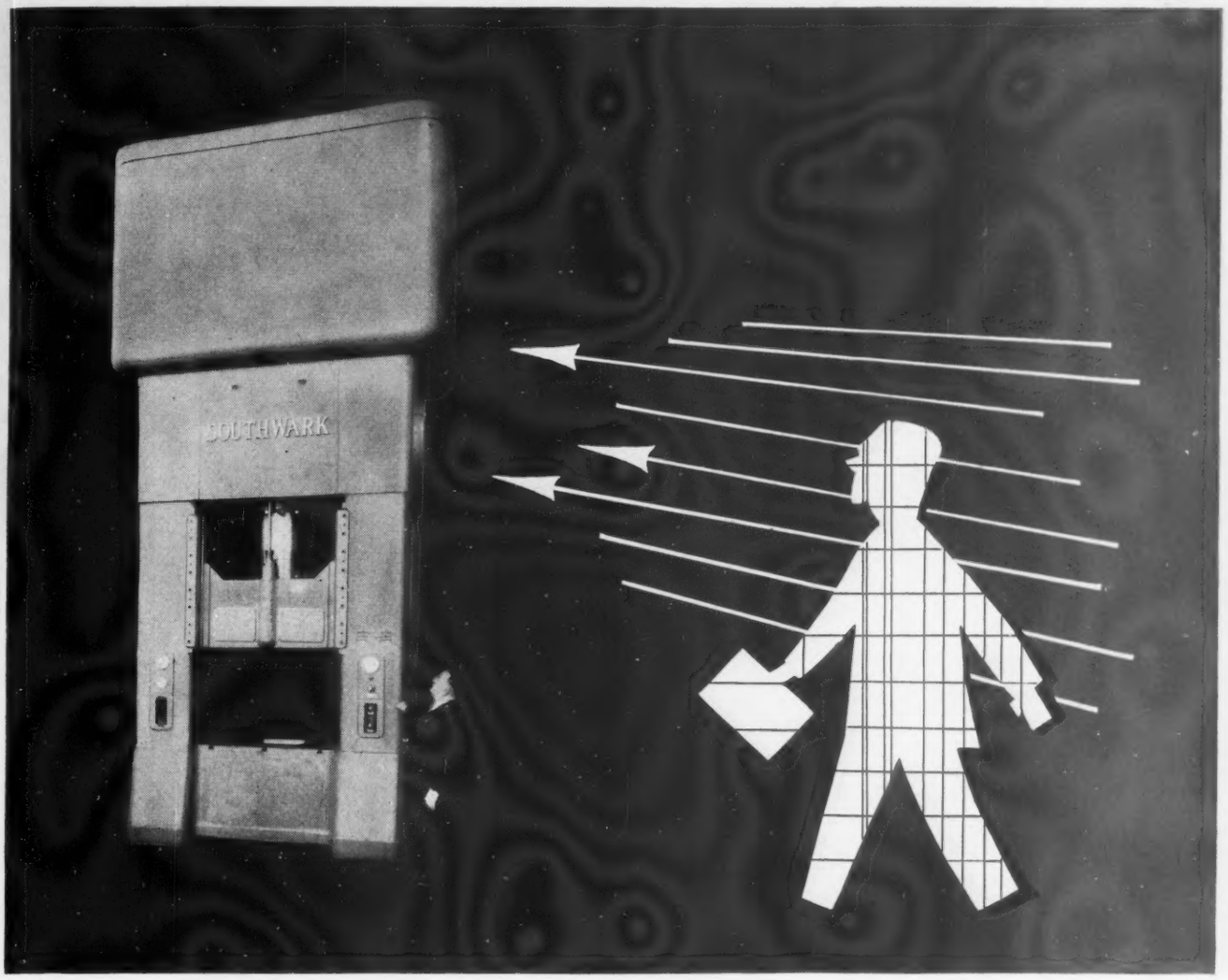
PARKER PRODUCTS CONQUER RUST



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The Rockrite Process

The Rockrite process is a complete departure from the familiar cold-drawing method of sizing seamless tubes. It is the modern process whereby semi-circular, grooved dies rock back and forth over the tube, compressing the metal against a mandrel which controls the inside diameter.

This process is adaptable to many grades and analyses of steel, and other metals, which are difficult or even impossible to cold draw. It can be used to raise the physicals of SAE X1020 to 115,000 psi yield strength, 15 per cent elongation, without heat treatment—and with free machinability at these high physical properties.

... CLOSE-TOLERANCE TUBING

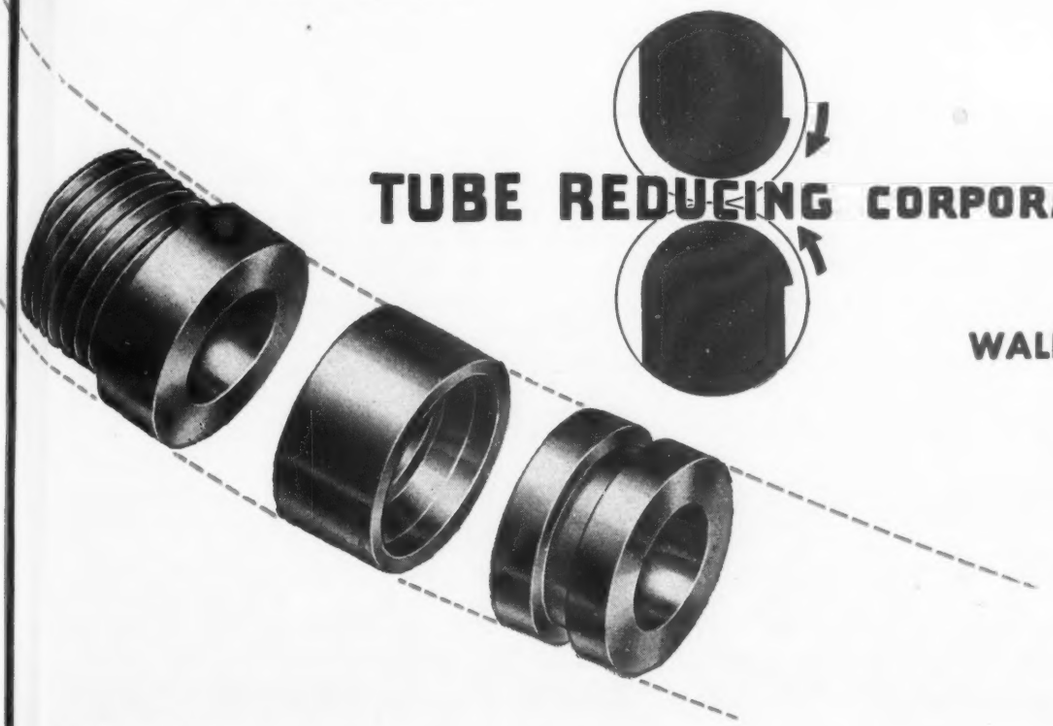
will help cut the costs of these 1947 *products*

As the buyers' market makes itself felt and business gets back to the brass tacks of competitive operations, machined parts like those illustrated are being made faster—and at lower cost—from close tolerance Rockrite Tubing than from ordinary tubing or from bar stock.

The advantages of fabricating from Rockrite has been demonstrated in the high-speed production of war-plant operation. In one case the use of Rockrite Tubing resulted in a 60 per cent increase in the output of finished parts. In another, production was doubled. Corresponding reductions in cost were, of course, realized.

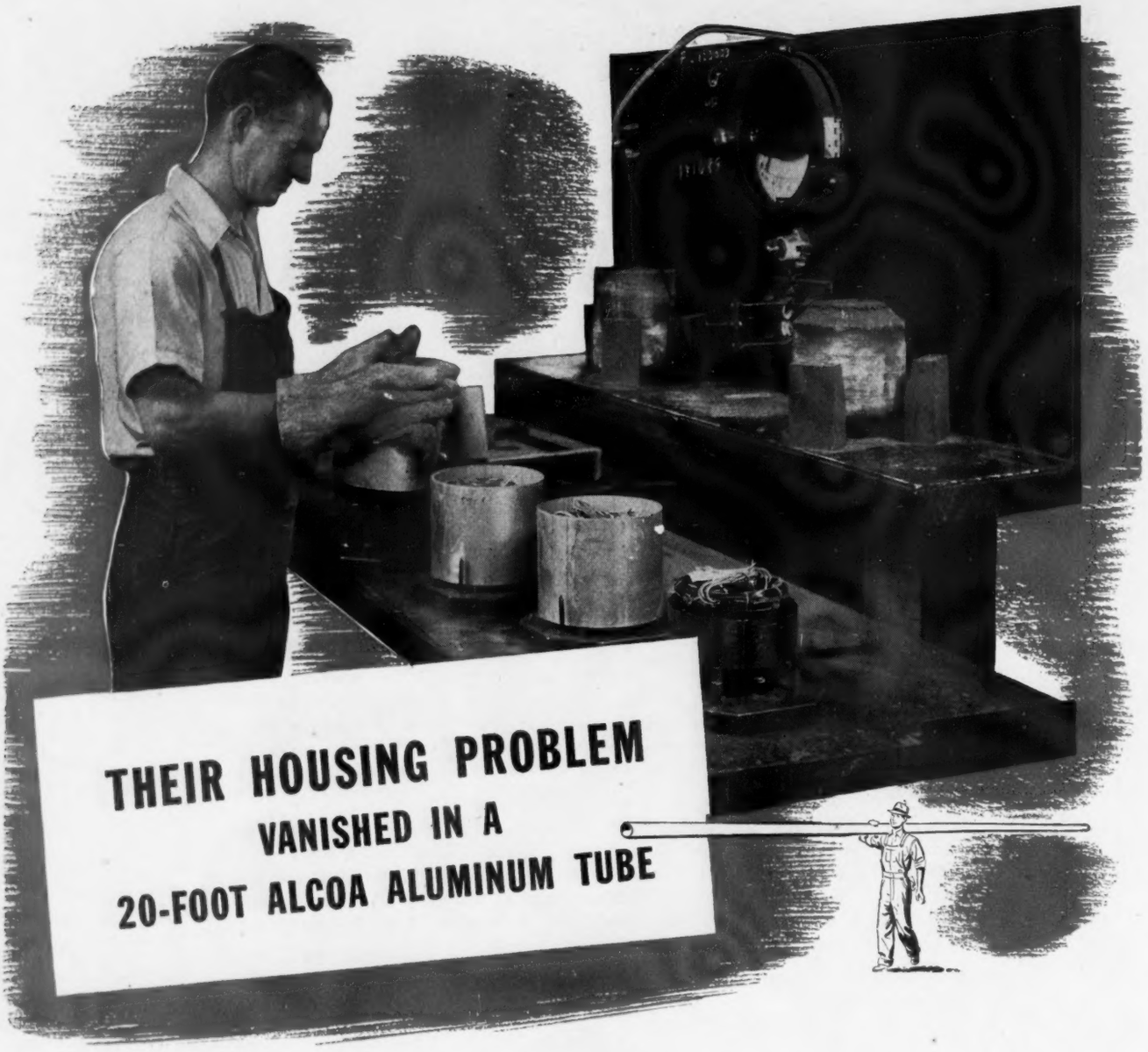
Such cost reductions are possible with Rockrite Tubing because it is more accurate in dimensions than tubes sized by any other commercial method. It is more concentric, has lower variations in wall thickness, and is sized to closer outside- and inside-diameter tolerances. This means lighter, faster, more uniform cuts in machining, longer tool life, practicable use of forming tools and other cost-cutting advantages.

Inquiries from designers of 1947 products are invited, and will be held in strictest confidence.



TUBE REDUCING CORPORATION

WALLINGTON, N. J.



One slash with a cutoff saw, a couple of minor machining cuts on the ends of each sawed section, and 20-foot lengths of Alcoa Aluminum Tubes become housings for the electric motors made by Standard Dayton Corporation.

The tubes require no boring. They are merely heat-expanded and slipped over the stators. On cooling, they fit tightly.

What's more, the aluminum housings give a reduction of one-third in motor weight and faster dissipation of motor heat.

When you design a new product, or redesign one already on your assembly line, consider the many commercial forms of Alcoa Aluminum. And our 59 years of aluminum know-how is at your service. ALUMINUM COMPANY OF AMERICA, 2112 Gulf Building, Pittsburgh 19, Penna. Sales offices in leading cities.

MORE people want MORE aluminum for MORE uses than ever

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

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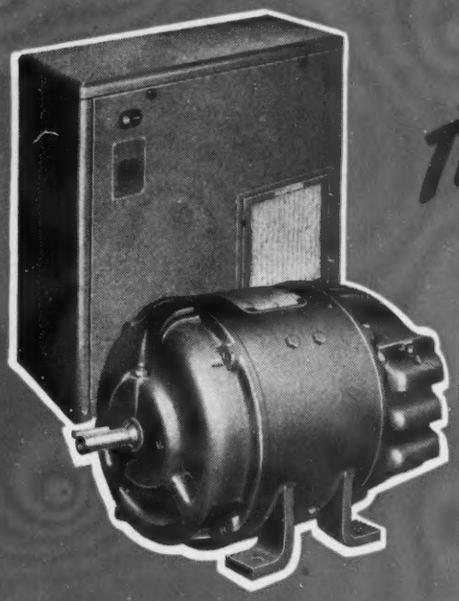
THE RIGHT SPEED FOR ANY CONVEYOR

from A-c. Circuits . .

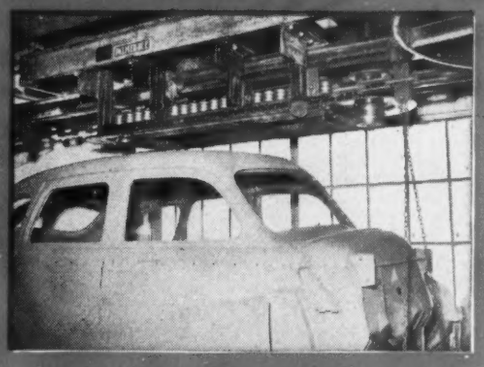
with RELIANCE V★S DRIVE



Conveniently-packaged, space-saving V★S Drives are available from 1 to 200 hp.

Reliance V★S Drive saves money and makes money in every plant it enters. A good example is the way it increases conveyor efficiency. This *All-electric, Adjustable-speed Drive, operating from A-c. Circuits,* provides the *exact* conveyor speed you want, exactly *when* and *where* you want it. Starting, stopping and reversing can be be gradual or instantaneous, and control may be manual or automatic —from nearby or remote stations.

For information about the many ways in which Reliance V★S Drive can be applied to save and make money, write for Bulletin 311.



V★S-equipped conveyors exactly match the speeds of auto bodies and chassis assembly operations.

RELIANCE ELECTRIC & ENGINEERING CO.

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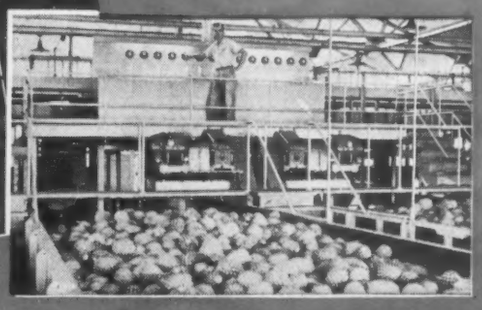
RELIANCE A-C D-C MOTORS

"MOTOR-DRIVE IS MORE THAN POWER"

Modern furniture plants find in V★S-equipped conveyors the ideal answer to faster finishing schedules.



Operator of central V★S panel controls 14 feeder-conveyors independently — delivers pineapples to main conveyor as needed.

Reliance Motors, respond instantly to centralized V★S controls.

For single or multiple cuts...

MO-MAX HIGH SPEED TOOL BITS...

...will give you BETTER RESULTS

These Ground Tool Bits, made of the famous MO-MAX High Speed Steel, have been used for many years . . . in thousands of plants . . . under all conditions. Without exception they have proved conclusively that they perform better than other high speed steels. They are finish ground on the sides after hardening. Specially packed for convenient handling, rust prevention and quick identification of sizes. MO-MAX High Speed Cut-off Blades, too, have the same superior cutting qualities. Try them both! You'll say they are the best you've ever used.

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STAINLESS STEEL ELECTRODES...

6 BIG FEATURES

1. **Excellent usability characteristics in *all* positions**
2. **Produces FLAT Fillets**
3. **Stable arc characteristics permit good directional control**
4. **Designed for a-c, d-c, or reverse-polarity d-c operation**
5. **Low spatter and easily removable slag**
6. **Full range of grades and diameters, numbered in AISI code to meet 98% of industry requirements.**

ARC-WELDING EQUIPMENT

ELECTRODES and

ACCESSORIES

HERE is the first *new* line of stainless steel electrodes brought out since the war—the first line to include improvements growing out of invaluable war production experience.

The result of many months of research and development, based upon this war experience, G-E stainless steel electrodes bring to you advantages and features *not heretofore available* in stainless rods.

All 27 types possess excellent usability characteristics in the *vertical and overhead* position as well as the horizontal. Stability of the arc and deposition characteristics have been engineered to assure *flat fillets,* materially reducing grinding time as compared to convex fillets, and reducing the crack-sensitivity at times associated with concave fillets.

Any operator of reasonable experience will have little difficulty maintaining good directional control of the stable, quiet arc. Two types of flux coatings make it possible to use these electrodes on any current—lime-type for reverse-polarity d-c, and a true Titania type that is equally excellent on either a-c or d-c, and in *any* position. Spatter is extremely low, slag behavior is good, and metal transfer is uniform and easily directed.

G-E stainless electrodes are packed in special cartons, wrapped in water-repellent paper for protection during transit and storage.

We can just begin to tell you here about these new electrodes, which round out G.E.'s outstanding line. But your G-E Arc-welding Distributor has the entire story—and he can give you prompt delivery on these new stainless or any other G-E electrodes, including the recently announced W-20 electrode and type W-32 for the fabrication of high-carbon and sulphur-bearing steels. Get in touch with him soon! ***Apparatus Department, General Electric Company, Schenectady 5, N.Y.***

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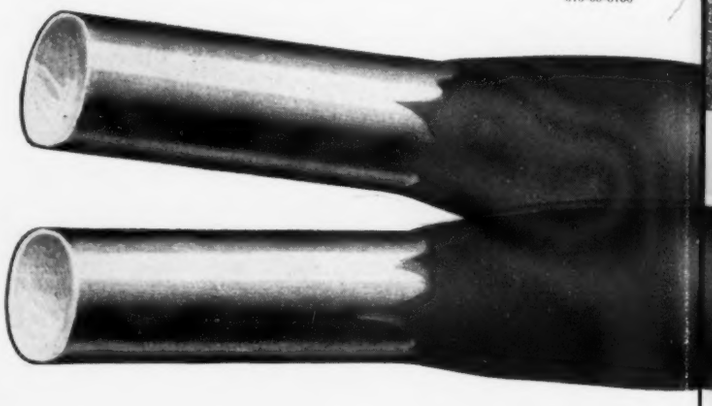

27 NEW TYPES...

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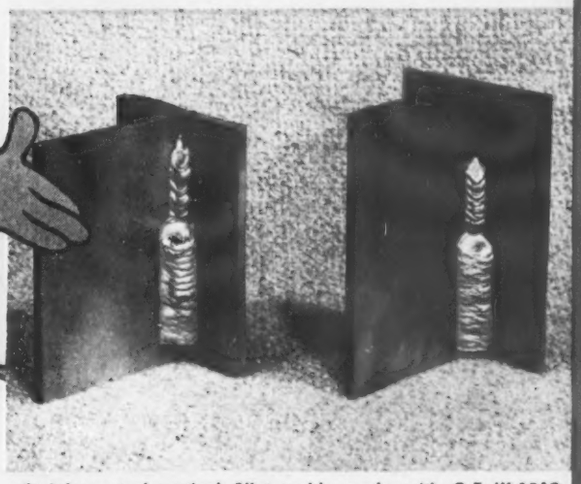
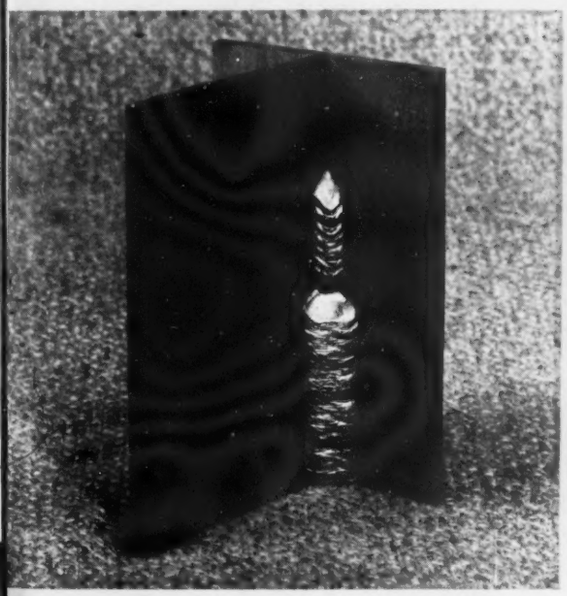
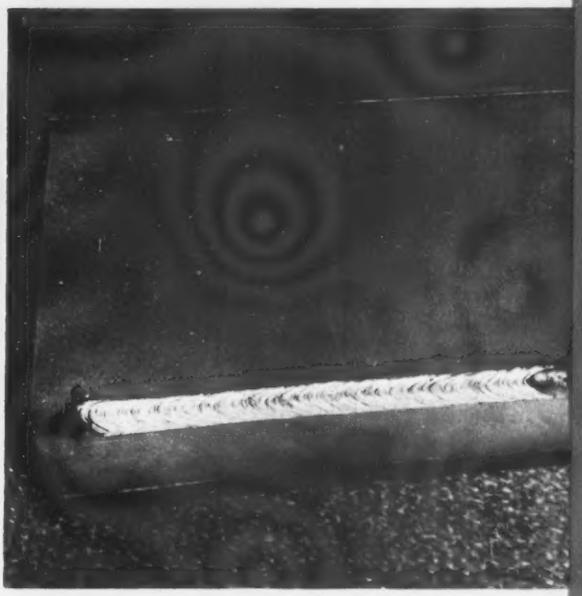
"Here are a few examples of the swell welding job you can do with these new G-E stainless electrodes! But why not prove it to yourself on some of your own work! Just contact your G-E Welding Distributor."



Stainless steel vertical fillet welds made with G-E W-1310 electrode (left) and W-2310 (a-c or d-c) electrode (right), both 5/32" diameter.



Two-pass fillet weld made from bottom up with G-E W-2310 stainless steel electrode, operating on a-c. D-c operation gives identical results.



Stainless steel horizontal fillet weld made with G-E W-2310 electrode operating on a-c. Note the smooth, flat appearance of the fillet.

The 27 types of G-E stainless steel electrodes are identified as follows:

W-1308
W-1309
W-1309Cb
W-1310
W-1310Cb
W-1316
W-1316Cb
W-1317
W-1330
W-1347
W-1410
W-1430
W-1446
W-1502
W-1503
W-1504
W-2308
W-2309
W-2309Cb
W-2310
W-2310Cb
W-2310Mo
W-2316
W-2316Cb
W-2317
W-2330
W-2347

NOTE: The first digit refers to coating, 1 being lime-type and 2 Titania type. The last three digits represent AISI stainless steel code numbers.

GENERAL ELECTRIC

He gets the FATTEST envelope

YOUR PAYMASTER never sees him . . . he never signs the payroll . . . but Inadequate Wiring, the industrial jinx, draws big money.

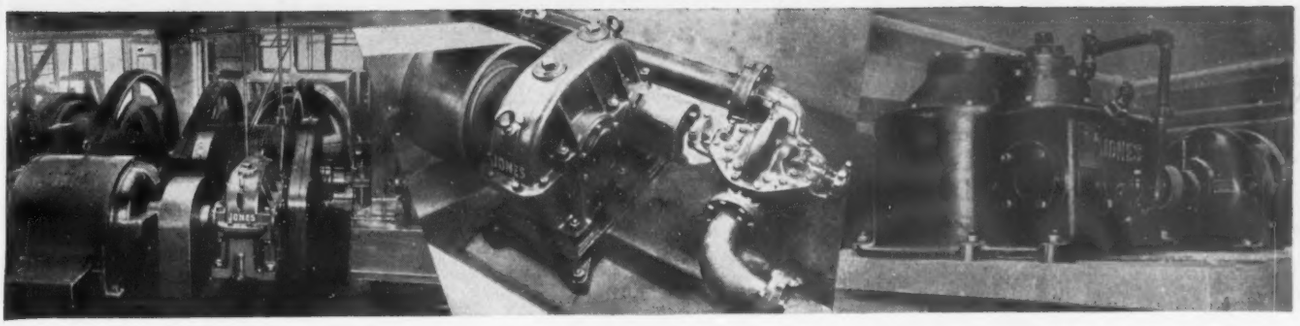
Week in and week out, overtaxed, overextended, obsolete wiring can tax plant efficiency 25 to 50 percent without detection until a major tie-up occurs.*

To remove this costly imposter from your payroll, call in your plant power engineer, your consulting engineer, electrical contractor or utility power salesman. These men can find his finger prints anywhere in the plant.

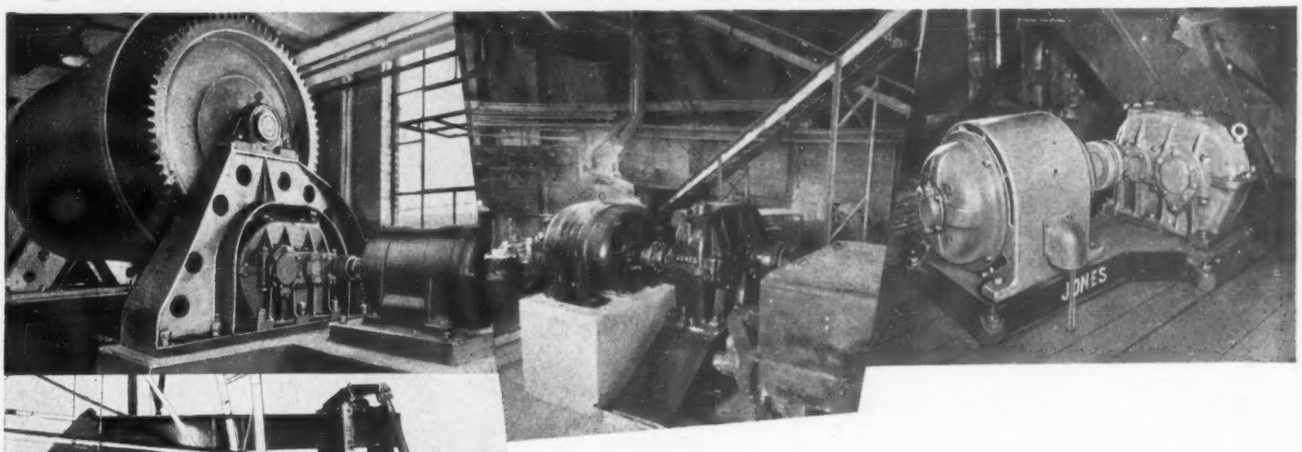
*WIRE AHEAD, a new booklet discussing preventive maintenance . . . the symptoms of inadequate wiring . . . and presenting plans for anticipating electrical demand, is now in preparation. We shall be glad to send it on request as soon as it is available.

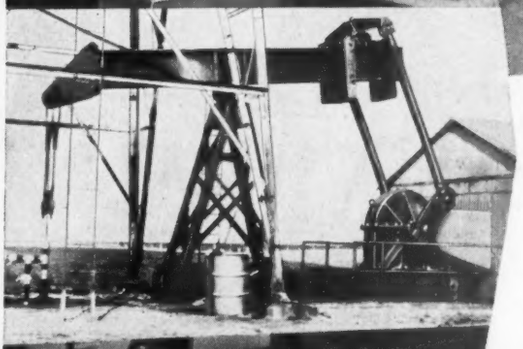
ANACONDA from mine to consumer

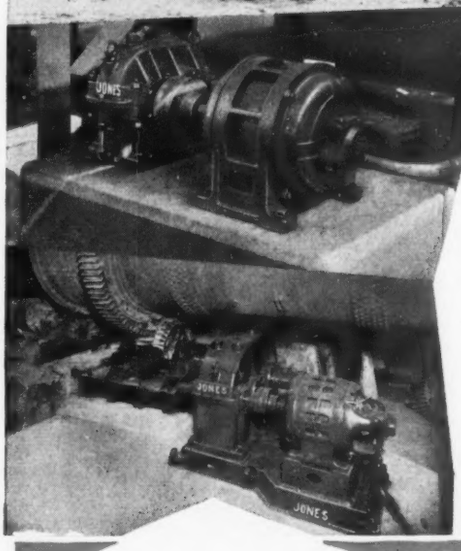
ANACONDA WIRE AND CABLE COMPANY



JONES DRIVES FOR INDUSTRY







• These illustrations show application of Jones drives to solve a wide range of industrial power transmission problems.

★ For many years the W. A. Jones Foundry & Machine Company has been called upon as a consultant, to help solve a great variety of difficult drives involving the use of speed reducers, gears and other transmission machinery. In many cases these installations have called for the development of special equipment, designed and built to suit the specific requirements of the project.

As a result of these years of experience, involving numerous special problems in the mechanical transmission of power, the Jones organization has collected a vast amount of technical data relating to work in various fields.

Specific bulletins and catalogs are available on the products listed below and a general 20 page bulletin "Jones Drives for Industry" presents a broad picture of Jones products, engineering services and manufacturing facilities.

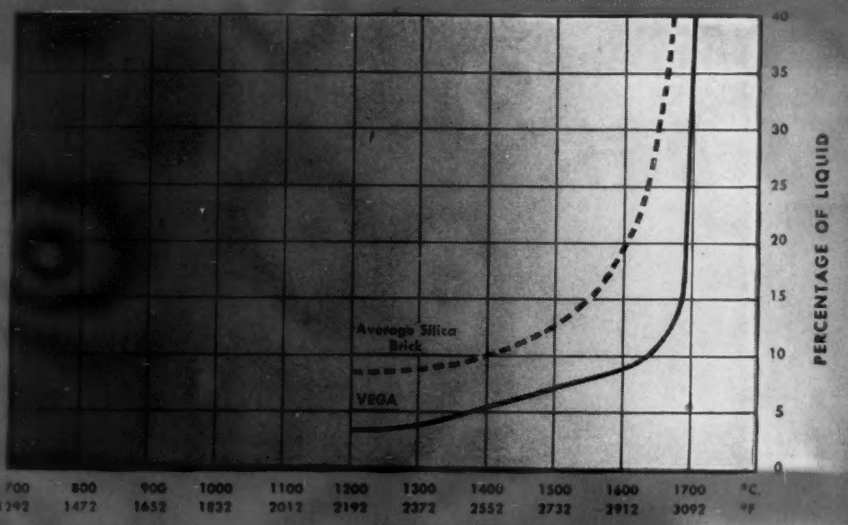
W. A. JONES FOUNDRY & MACHINE CO.
4437 Roosevelt Road, Chicago 24, Illinois

JUST ASK FOR BULLETIN NO. 80 ➡

Jones

HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS • CUT AND MOLDED TOOTH GEARS • PULLEYS
ANTI-FRICTION PILLOW BLOCKS • V-BELT SHEAVES • FRICTION CLUTCHES • TRANSMISSION APPLIANCES

The 60° F. to 100° F. higher refractoriness under load which characterizes VEGA, the Super-Duty Silica Brick, gives it a distinct advantage for service in high temperature melting furnaces. It permits operation at higher temperatures with increased production or if no change is made in the furnace operation, the normal expectation is an extended life of at least 20 per cent.



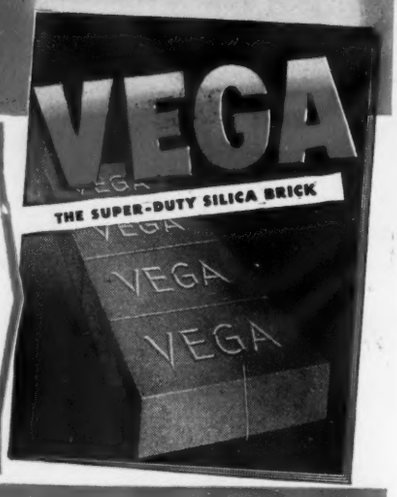
MELTING BEHAVIOR CHART BASED UPON HARBISON-WALKER RESEARCH AND PUBLISHED DATA

Note the melting behavior of a silica refractory with a total of 1.2% alumina, titania and alkalies, and 2% of lime. This silica brick — a fair average of commercially available silica refractories — becomes 10% liquid at 2550° F. (See broken line on chart.)

Contrast the melting behavior of VEGA Super-Duty Silica Brick, a refractory containing a total of only 0.4% alumina, titania and alkalies, and 2% of lime. Note that VEGA does not become 10% liquid until a temperature of 2970° F. is reached . . . more than 400° F. higher. (See solid line on chart.)

Note, too, that VEGA does not develop 30% liquid until a temperature of 3090° F. is reached, while the average silica brick reaches this stage of melting at 2990° F., a full one hundred degrees lower. These temperatures correspond closely to the maximum temperatures at which the brick will sustain heavy loads.

REQUEST YOUR COPY OF THIS BOOKLET



What is a Super-Duty Silica Brick?

Answer: ONE HAVING A TOTAL OF NO MORE THAN .5% OF ALUMINA, TITANIA AND ALKALIES

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WORLD'S LARGEST PRODUCER OF REFRACTORIES
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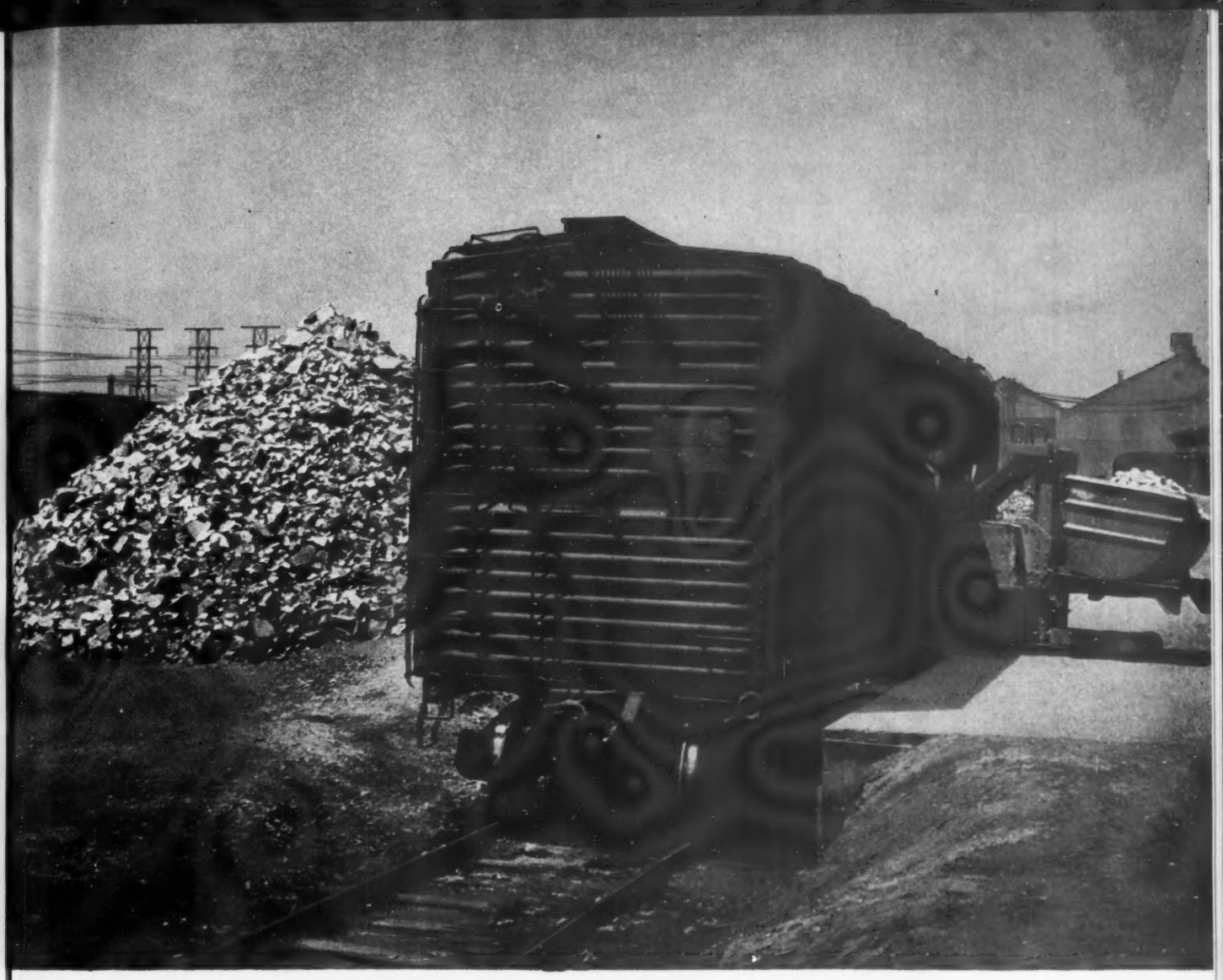

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Adequate stocks of VANCORAM ferro-alloys, metals and chemicals are maintained to assure prompt shipment of your orders.

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CASTINGS

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HEIGHT . . .	16'-4"
WIDTH . . .	15'-0"
DEPTH . . .	4'-2"
SHIPPING WEIGHT . .	41590#

REDUCE FINISHING TIME

When you want large steel castings, such as this ship rudder frame, true to your pattern with sharp contours and clean skin—specify Birdsboro Precision Steel Castings made by the Randupson Process.

Birdsboro's close control over every step in making castings insures accuracy and often enables you to by-pass many machining and straightening operations. It facilitates assembly and holds down your production costs.

Regardless of size or shape—don't hesitate to consult Birdsboro on your individual steel casting requirements.

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Manufacturers of Steel Castings, Steel Mill Equipment, Iron and Steel Rolls, Hydraulic Presses, Crushing Machinery and Special Machinery

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PRECISION STEEL CASTINGS

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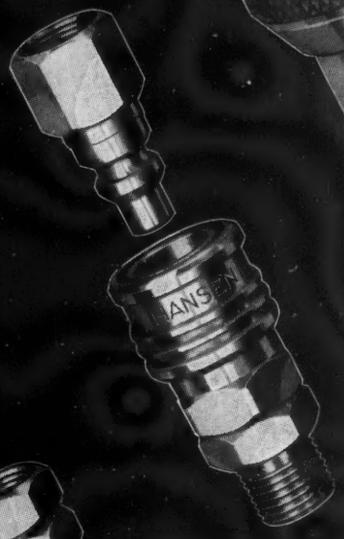
AIR, OIL—GREASE COUPLING



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ACETYLENE COUPLING

Hardly a day passes that adaptations to new uses for Hansen couplings are not found—many being discovered right in the field.

The possibilities of Hansen Couplings are unlimited because of their simplified design, adaptability, and remarkable performance. They can be used anywhere, within their wide range of standard sizes, on anything that handles air, oil, grease, oxygen or acetylene—and will handle pressures from ounces to 10,000 pounds.

To connect a Hansen hose coupling, you merely push plug into socket—to disconnect, slide the sleeve back with your thumb. In both cases, flow is immediately and automatically turned on or off. No time wasted, no losses.

FOR OXYGEN ACETYLENE AIR, GASOLINE OIL, GREASE STEAM

The adaptability of Hansen Couplings to so many different uses is the best possible evidence of their correct design. Our representatives will be glad to discuss with your engineers the possibilities and advantages of Hansen Couplings.

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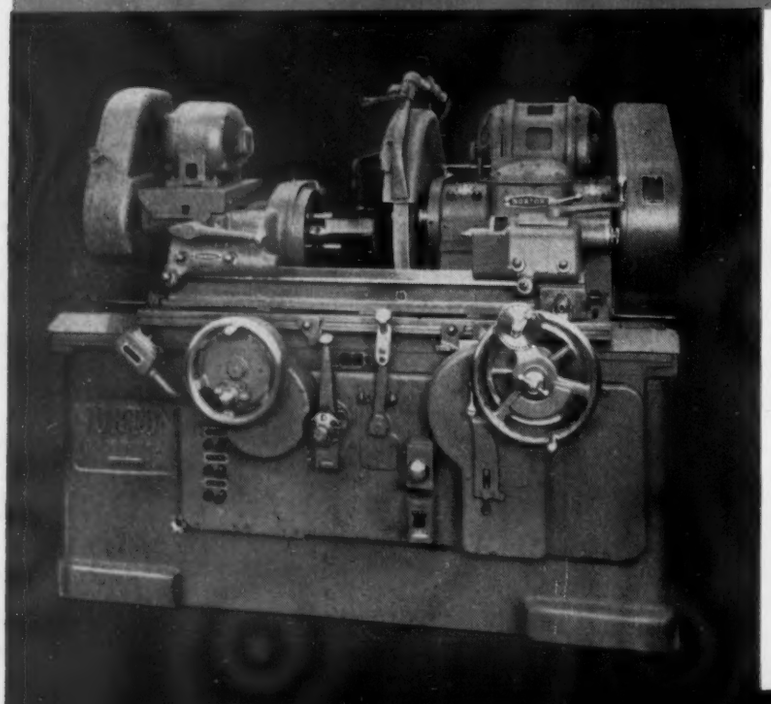
For High Precision on a High Production Basis . . .

4" TYPE C GRINDER

The 4" Type C Machine, available in 12" and 18" lengths, is sturdy and compact — designed for turning out small cylindrical work in diameters up to 2". Extreme accuracy is maintained at a high rate of production. Work speeds range from 100 to 1000 r.p.m.

A new catalog, Form 287, gives complete details.



10" TYPE C GRINDER

This grinder is excellent for work such as large shafts, camshaft main bearings and various engine parts. Constructed for the operator's convenience. Wherever operated, this machine has met every demand for improved finish and increased precision. Built in 18", 36", 48", 72", 96" and 120" lengths.

Form 2288 gives full information about the standard machine and Form 1367 about the semiautomatic.

NORTON GRINDERS and Lappers

NORTON COMPANY, WORCESTER 6, MASS., U. S. A.

NORTON CYLINDRICAL GRINDERS

6" TYPE C GRINDER

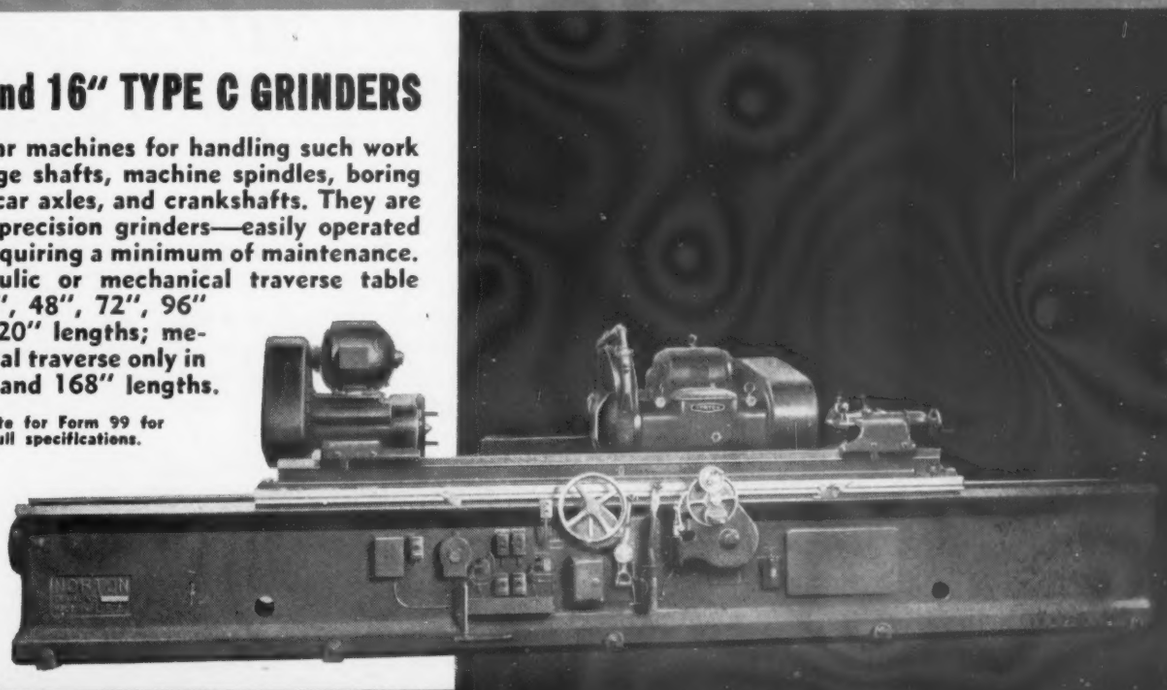
An ideal machine for small center type operations in small or large quantities, giving a high rate of efficiency. This grinder, and also the 4" and the 10" can be furnished with semiautomatic arrangements which increase output, reduce work cost and save time.

Specification details on the standard grinder given in Form 379, and on the semiautomatic in Form 243.

14 and 16" TYPE C GRINDERS

Popular machines for handling such work as large shafts, machine spindles, boring bars, car axles, and crankshafts. They are large precision grinders—easily operated and requiring a minimum of maintenance. Hydraulic or mechanical traverse table in 36", 48", 72", 96" and 120" lengths; mechanical traverse only in 144" and 168" lengths.

Write for Form 99 for full specifications.



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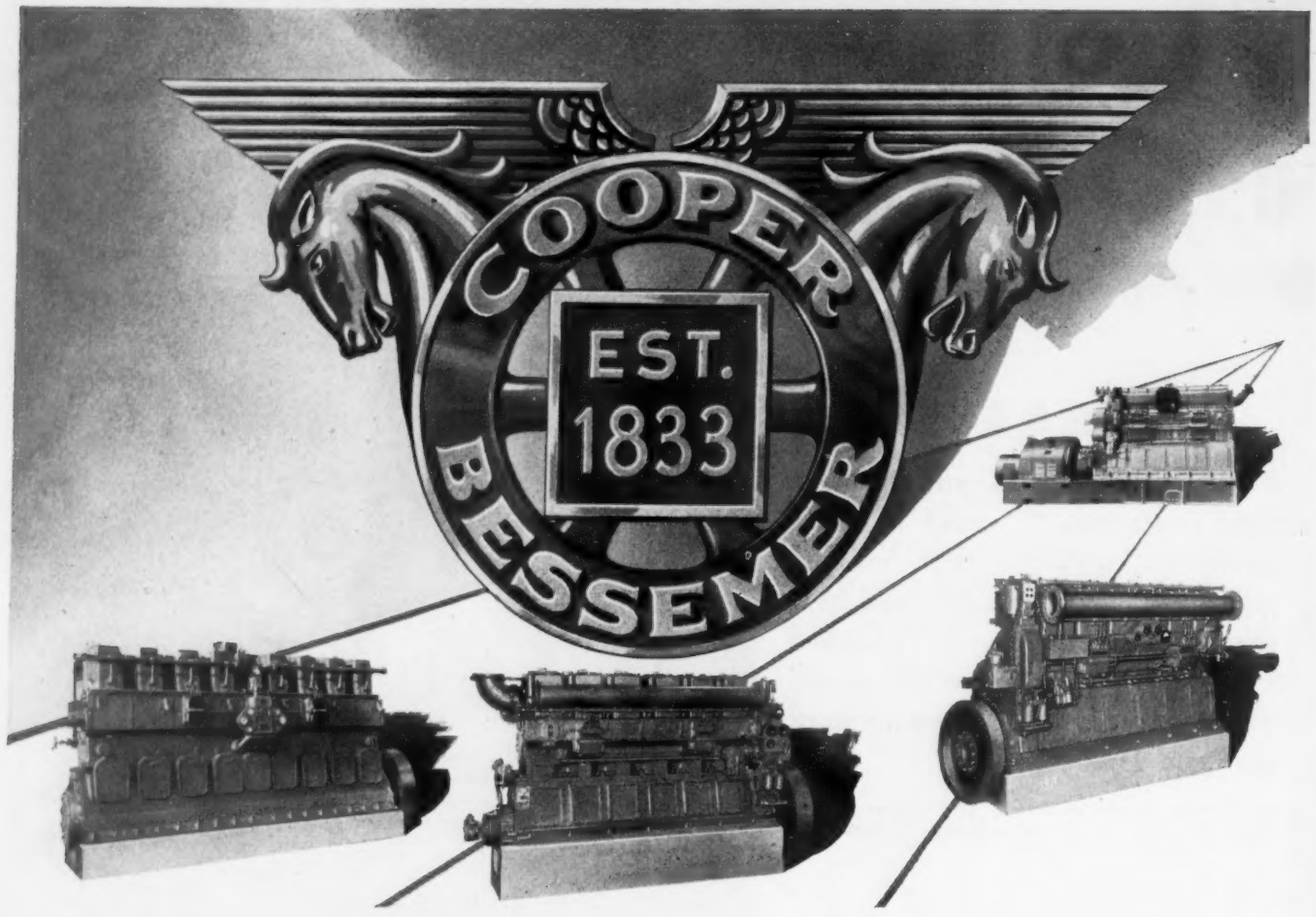

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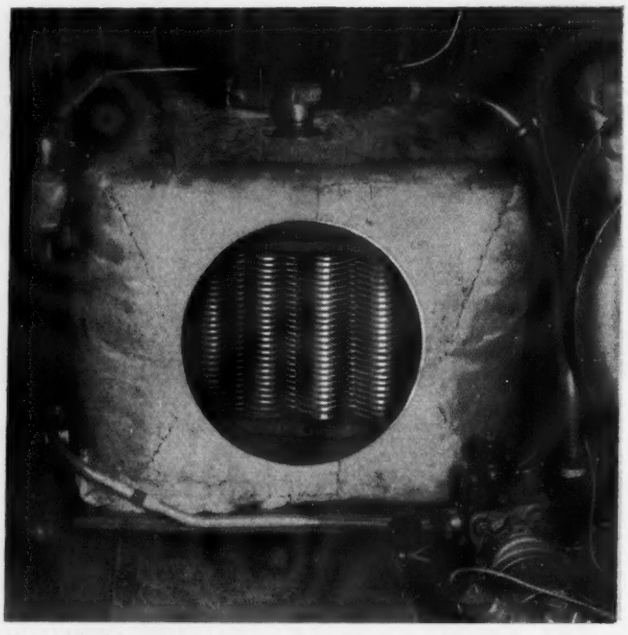
The new Douglas DC-4s, as a result of successful tests, will be equipped with cooling units which will keep temperatures in cabin interiors down to a comfortable degree in hot weather. Wolverine Trufin forms an essential part of this recent development.

Trufin all-one-piece, aluminum finned tube is ideal for aircraft use in heat exchangers. The heat transfer coefficient is high, thereby reducing the required surface area and ultimately saving volume and weight. Because the fins are integral with the tube itself, Trufin resists vibrations and retains its efficiency.

This illustrates another application of Wolverine Trufin, again demonstrating the high performance values this unique tube delivers in compact space.



Air is sucked into the airplane by a fan and routed through the cooler flowing around the outside of the finned tubing, and then dispersed in the main cabin. In this application, Wolverine Trufin contains a mixture of alcohol and carbon dioxide at a temperature of approximately 100° F below the freezing point of water. This mixture is obtained by dropping dry ice into the tank containing methyl alcohol, and is pumped through the cooler as a liquid. This cooling system appreciably lowers the temperature of the cabin for the passengers' comfort during hot weather.

The cooler has 84 individual pieces of Trufin, each 4 inches long. Two coolers are used in the cooling system.

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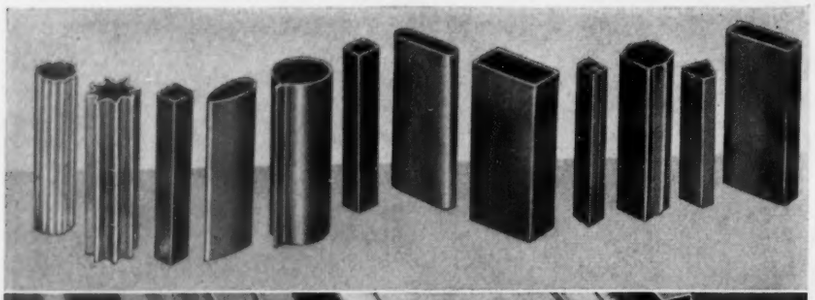

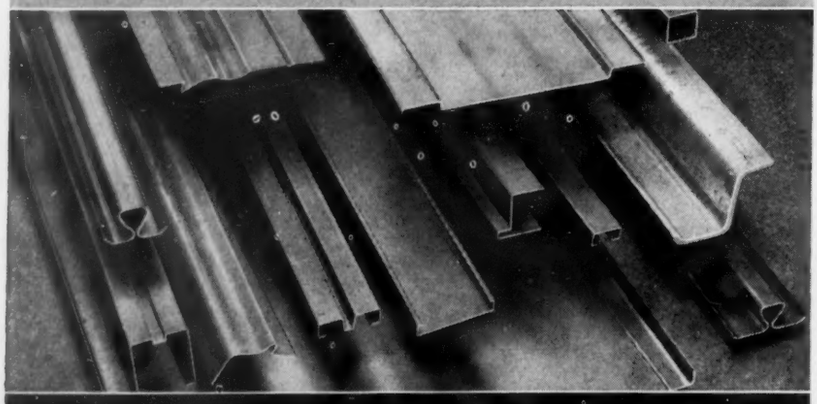

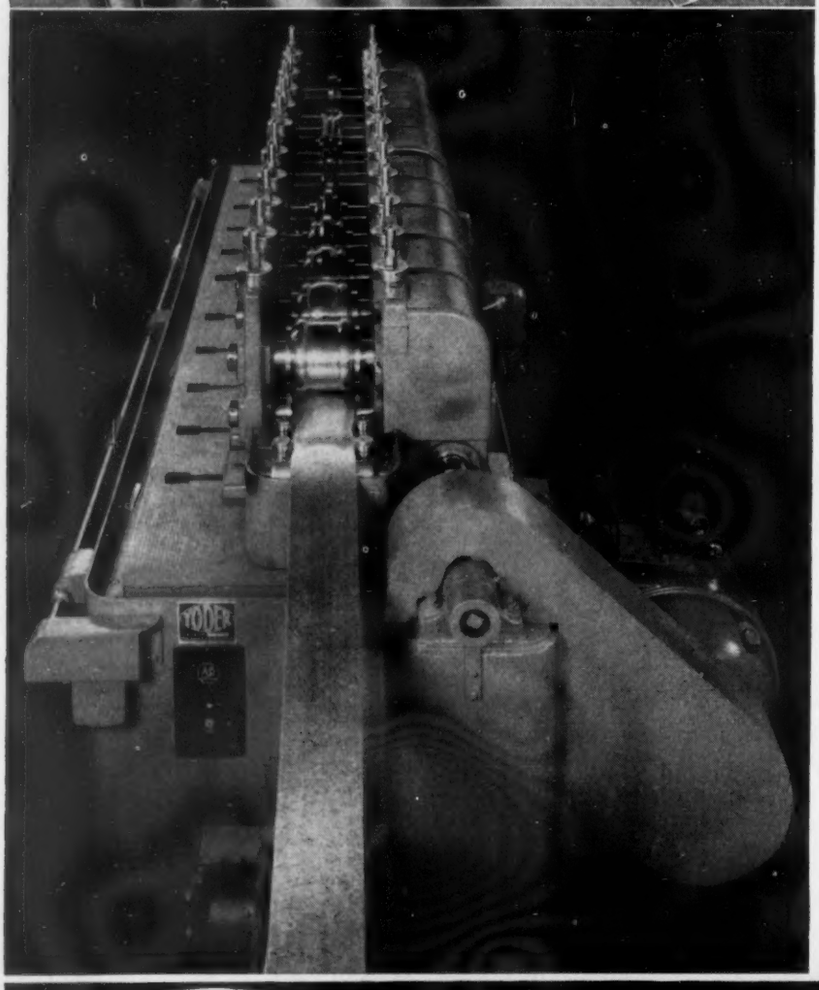

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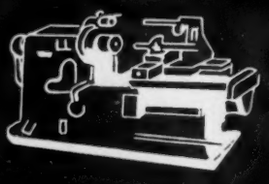

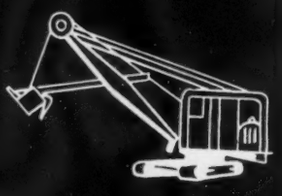

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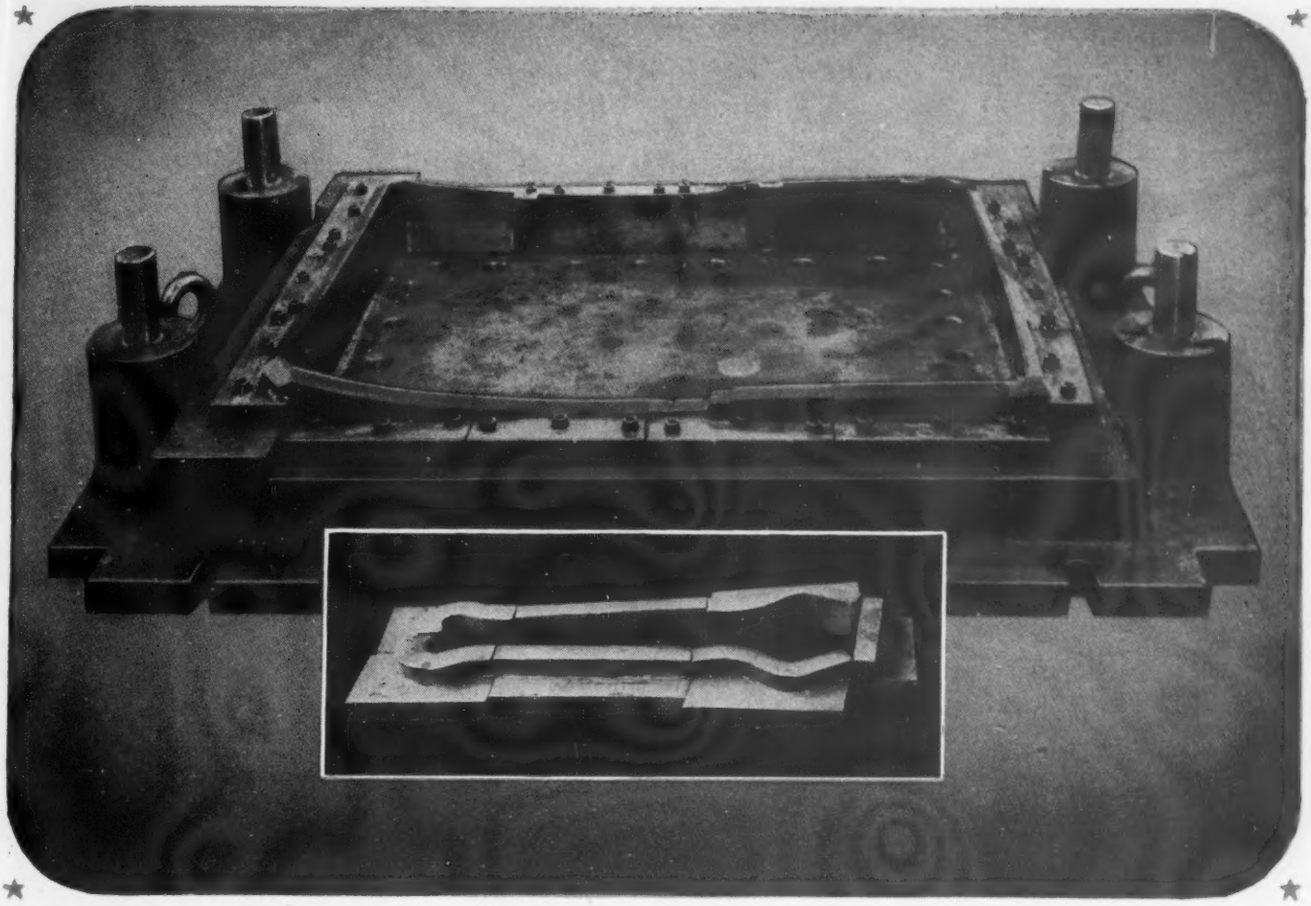

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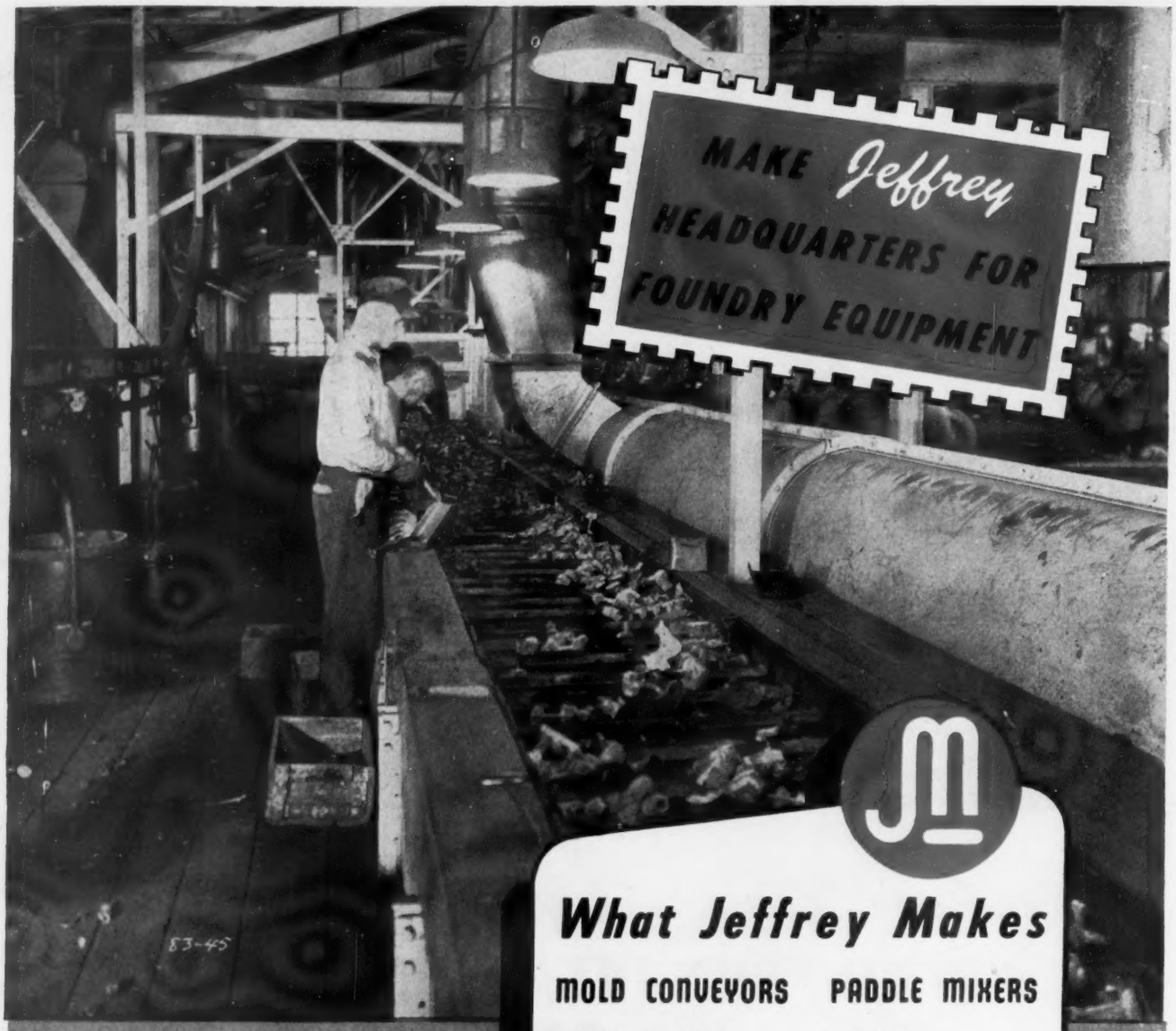

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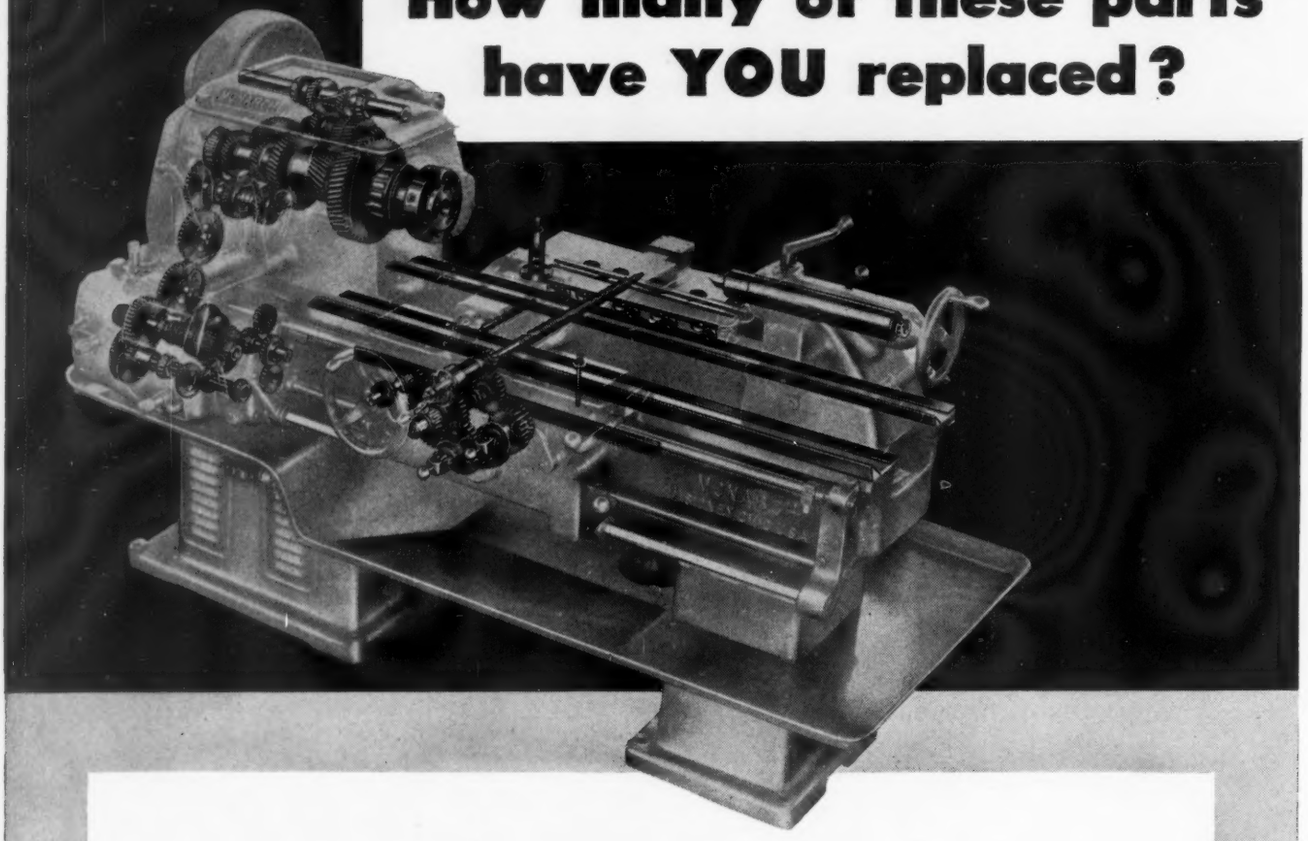

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The Welded Steel Press
New Enameling System
Minimizing Steam Losses

STEEL

The Magazine of Metalworking and Metalproducing

VOL. 120, NO. 6 FEBRUARY 10, 1947

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Minovar is a nickel alloyed cast iron that successfully minimizes dimensional changes in precision equipment, even under wide temperature changes.

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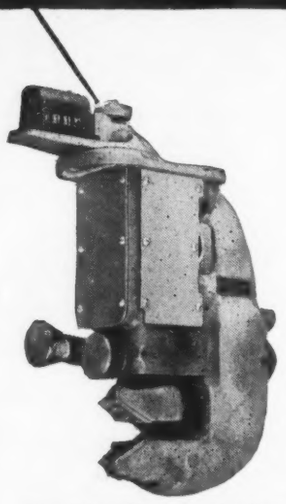

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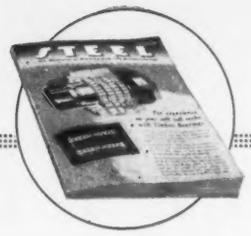


February 10, 1947

Narrow the Gap!

In view of the conciliatory attitude that has characterized wage negotiations in the steel and automotive industries thus far, it may be pertinent to speculate a bit upon the margin that exists between the ideal and the practical solutions of the current problem.

If the principals on both sides could voice their honest convictions openly, they probably would say that the ideal procedure would be for the unions to refrain from asking for additional wage increases at this time, for management to reduce the prices of steel and automobiles and for labor and management to strive to the utmost to achieve a degree of efficiency that would go far in justifying some of the wage increases of the past. This course of action would provide greater real income for the workers and more liberal profits for the owners during the long-term future than any other plan of action. It would exercise a powerful corrective influence upon price trends and would aid materially in easing the national economy from its dangerous plateau of inflated values and onto a solid foundation of stability. Its salutary repercussions might be strong enough to permit the nation to get down to a sound economy without the necessity of going through a primary postwar depression, as it did in 1921.

Unfortunately, there are reasons why it will be difficult and perhaps impossible to achieve the ideal settlement. Some economic fallacies have become so widely accepted during the past decade that they cannot be dissipated over-night. So many extraneous considerations have been injected into the wage picture during recent years that it will be difficult to get down to fundamentals in one fell swoop. There are inhibitions, face-saving requirements, inertia and other factors that will prevent full play of common sense in the pending negotiations.

For these reasons, one must be realistic enough to expect that the final solution will fall short of the ideal one. At the same time, one can hope that the gap between the practical and the ideal will be narrowed to the smallest workable limits.

The approach is obvious. If the unions and management can agree upon a wage increase—the more moderate the better—and if everybody concerned can go ahead uninterruptedly with adequate materials, supplies and manpower so as to permit the first real test of postwar industrial efficiency, the result may be such as to justify the price reductions and collateral benefits so necessary to a sound economy.

° ° °

COAL IS A CHALLENGE: If man could see conditions all over the world simultaneously, he would be amazed at the degree in which coal is the limiting factor in postwar progress.

Shortage of coal is holding down Japanese steel output. Likewise, it is condemning hundreds of millions of persons in the Far East to desperate conditions of living. Lack of coal limits steel production on the European continent and in England. Its scarcity in the midst of one of Europe's most severe winters is creating hardships that will have far-reaching political and social repercussions.

There are abundant supplies of good coal in Asia and Europe, but the fuel is not being brought to the surface and delivered where it is urgently needed. In the United States we are currently mining coal at a near-record pace, and although we have experienced costly work stoppages during the past 18 months, we have been able to supply our domestic needs and to ship liberal tonnages to coal-starved nations overseas.

This priceless fuel is coming from mines still under government control and subject to the whims of a union dictator. Isn't it clear that when coal is in

(OVER)

AS THE EDITOR VIEWS THE NEWS

such a precarious state everywhere, there is something fundamentally wrong with coal mining?

Here is something for the world to study and to find a sound solution. —p. 85

° ° °

PROGRESS IN ENAMELS: During the war the United States Bureau of Standards developed a ceramic coating which was used extensively by the Army and Navy on exhaust systems of aircraft and other engines. This coating, consisting of 80 per cent ground coat frits and a 20 per cent admixture of alumina, proved to be highly resistant to chipping under repeated thermal shock, protected the metal against oxidation during prolonged exposures to temperatures up to 1250° F. and did not crack or blister.

Much interest is being manifested in the comparatively new commercial titanium opacified porcelain enamels which produce sufficient opacity (white covering power) at 15 to 18 grams per square foot. These enamels are mostly of the acid-resisting type and they have good draining qualities.

These are two of several recent developments in the field of enameling which promise to give a good account of themselves in postwar applications.

—pp. 92, 103

° ° °

WATCH CALIFORNIA! A special report by Eltinge T. Brown, manager of the Metal Trades Manufacturers Association of Southern California, focuses attention upon the advancement of the West Coast to a position of importance in the nation's metalworking industries. His report covers wages, employment and unionization in foundries, structural and forge shops and manufacturers of machinery, machine tools and accessories.

In general, the West Coast ranks third among the nation's industrial areas as to the number of plants and fourth as to the number of employees in most of these categories, according to the report. Degree of unionization, in most cases, is higher in the Pacific Coast area than in other districts in the nation, although the percentage of unionization in the Los Angeles district is lower than that of other West Coast communities. In the main, hourly wages in the Pacific states are higher than those in eastern industrial sections.

It will be profitable to watch developments west of the Rockies as industry consolidates its wartime gains. —p. 84

SIGNS OF THE TIMES: National Machine Tool Builders Association announces that its 1947 Machine Tool Show will be held in the Dodge-Chicago plant near Chicago airport Sept. 17 through 26. The association held previous shows in Cleveland in 1927, 1929 and 1935. Next September's affair, the theme of which will be "more goods for more people at lower prices" (p. 69), should be the largest and most important machinery exposition ever held. . . . War Assets Administration reports that as of Feb. 1, of the government-owned iron and steel projects including chiefly blast furnaces, steelworks, rolling mills, foundries and forge shops (p. 70), 44 which cost the government $497,789,325 have been sold for $189,664,229, 18 costing $82,244,895 have been leased and 84 costing $327,444,797 still await disposal. . . . A die steel has been developed which can be machined in hardened state. With a hardness greater than 300 brinell (p. 104), it is only slightly more difficult to machine than fully annealed steels used for the same purpose. . . Secretary of the Treasury John W. Snyder states that on Dec. 31 over 99 per cent of the 318,866 terminated war contracts had been settled (p. 73), another war task virtually completed. . . . Motive power engineers are studying the performance of two Canadian Pacific locomotives equipped with welded boilers. The automatic submerged melt welding process was used to join the longitudinal and girth seams of these boilers (p. 94) and stress relieving was performed in a fully automatic car-bottom indirect heating furnace. . . . Use of government-owned surplus steel, including H-piling, permitted rapid construction of the Navy's piers and bulkheads at Green Cove Springs, Fla. (p 76), where 554 inactive naval vessels will be berthed. . . . While Congress seems to be veering toward moderation in its attitude toward labor, there is a good chance that legislation prohibiting boycotts by unions will be passed. Evidence of union control of the lighting fixture business (p. 72) convinced many senators that the boycott abuse must be outlawed. . . . An expert on babbitt bearings says that for every large shop that is well equipped and staffed for casting babbitt efficiently there are dozens where no established routine is followed and where the results are erratic. By following a few simple rules (p. 106), a careful workman in any shop should be able to pour sound babbitt bearings.

E. L. Shaner

EDITOR-IN-CHIEF

A Word About Steel Claims

For more than fifty years Inland has been recognized as a leading manufacturer of uniformly high quality steel. But, at times, chemical analysis or method of manufacture does not always result in a product that can easily be formed or fabricated by *every* type of equipment. Occasionally human errors occur in the ordering as well as the production and fabrication of steel.

We recognize, in these situations, one of Inland's best opportunities to give practical metallurgical and engineering aid. So we urge you always to let us know whenever you might have the slightest difficulty in using any Inland product. Sometimes a different steel is required. Usually a slight change in forming or fabricating method may do the trick. But no matter what the cause or result may be, or whose steel is involved, in the Inland area, we are always ready to help you solve the problem to your complete satisfaction.

This policy of complete customer satisfaction has been in effect for many years. Its formulation and practice is the result of our desire to see that every shipment of steel does its job well.

Today, as you know, the great demand for steel exceeds production so we cannot supply all the steel needed by our customers. However, we are bending every effort in the development of new facilities to increase production output . . . so that, for your future needs, Inland will be an even better source of quality steel.

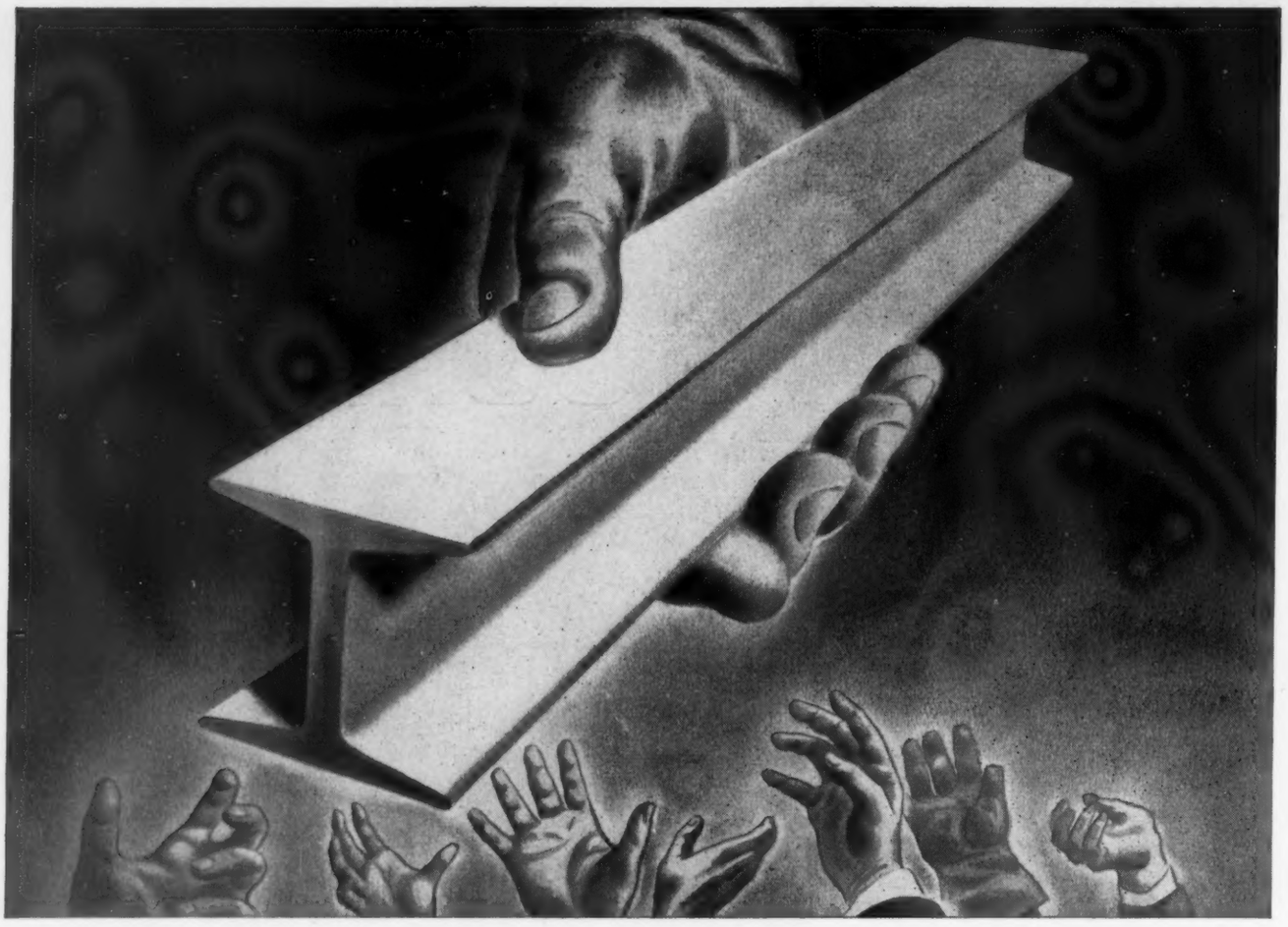
You, too, can help the steel shortage! Scrap is needed to make new steel. Please see that yours is returned promptly to the mills.

PRINCIPAL PRODUCTS: BARS • STRIP • TIN PLATE • STRUCTURALS • PLATE SHEETS • REINFORCING BARS • FLOOR PLATE • PILING • RAILS • TRACK ACCESSORIES

INLAND STEEL CO.

38 South Dearborn Street, Chicago 3, Illinois

Sales Offices: Detroit • Indianapolis • New York • Kansas City • Milwaukee • St. Louis • St. Paul



Brother, can you spare a beam?

Steel is like money. When you need it, you need it *badly*. That's why we have many steel plants to give next-door service most anywhere.

But lately it's getting so we hesitate to open the mail or answer the phone. We *know* there will be friends asking for steel—steel they need badly—and often we just are not able to fill the bill.

And here's what's causing it all

For a while it looked as though production would soon catch up with demand. Now that time seems more distant. The many things holding up top steel production have been slow to clear away. Unpredictable stoppages keep popping up, and shortages have brought other delays. You know about many of them. We've been doing our best, but for reasons beyond our control, we're still getting orders we can't fill.

But remember this:

One of these years the steel situation is going to change for the better. When that happens our plants will be among the first to stock products now hard to get and we'll burn up the roads rushing your steel to you. In preparation for that day, we're improving and expanding facilities, to protect the quality of Ryerson steel and ship it to you faster.

We are even now building a new plant and adding extensively to equipment at 11 others.

Meanwhile, the steel you need or a practical alternate may be in stock. So contact the nearest Ryerson plant with the full knowledge that we will do everything in our power to work with you.

JOSEPH T. RYERSON & SON, INC., Steel-Service Plants at: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles.

RYERSON STEEL

Tin Plate Demand 25% Over Supply

Shortage arises from increased requirement and scarcities of sheet steel and tin metal. Export quotas questioned

WASHINGTON

ABNORMALLY high demand at home and abroad will continue to press the tin plate industry throughout 1947, interested government authorities believe.

This high demand, estimated to be 25 per cent greater than in 1941, is bumping squarely against shortages of sheet steel for plating and against a scarcity in tin.

Overall demand for tin mill products this year is estimated at 4,300,000 tons. Production is expected to reach 3,800,000 tons, indicating a shortage of about 500,000 tons.

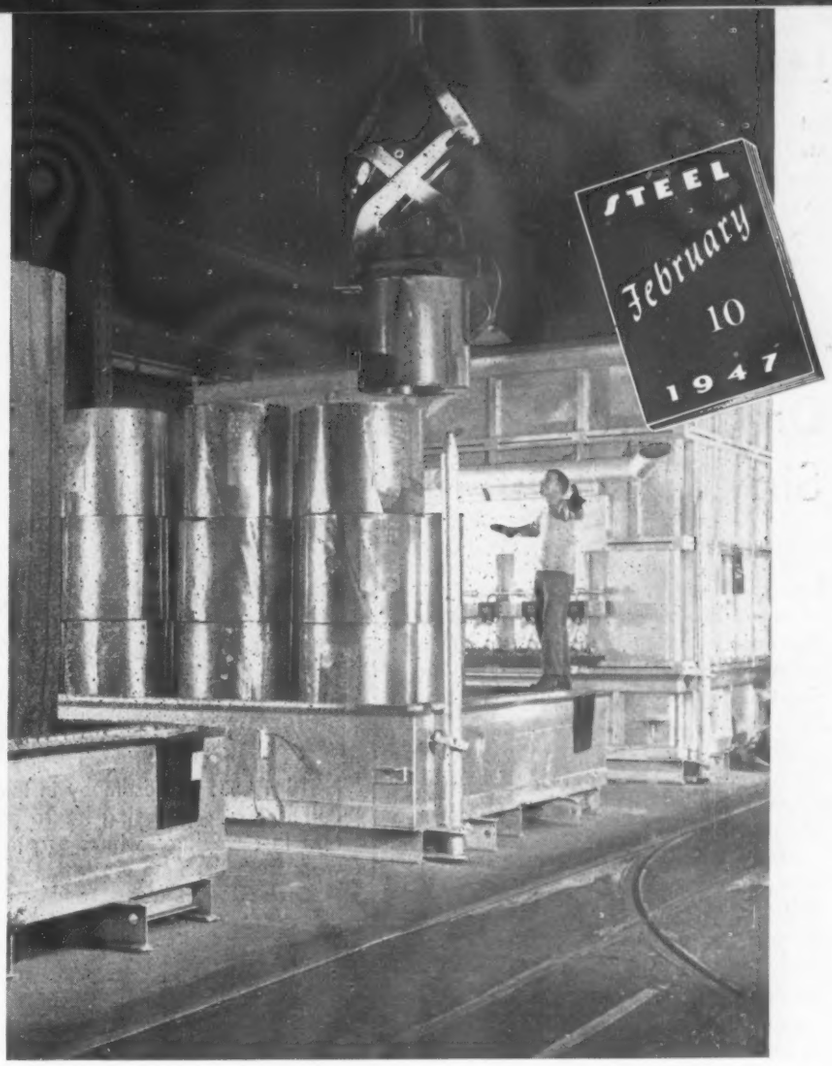
This situation already has prompted a major can producer to begin allocating tin plate to its customers according to a specified base period use (STEEL, Jan. 27, p. 53).

On top of the expanded domestic demand for tin plate, exports are taking a substantial tonnage. For April and May, for example, 65,000 tons have been authorized for export. As yet it is not certain that this tonnage will be available for export; it is merely a target figure.

Of the total demand of 4,300,000 tons, tin plate for cans will take an estimated 3,457,000 tons, which compares with 2,800,000 tons in 1941. In addition, substantial tonnages of tin plate will be needed for closures, for miscellaneous uses, and for Canadian requirements, which are established as a separate figure.

For packaging specific products, 270,000 tons will be needed for oils; 50,000 tons for tobacco, snuff and cigarets; 190,000 tons for beer cans; and 1,600,000 tons for fruits and vegetables. All these are domestic uses.

Government officials do not expect any appreciable improvement in the tin supply situation before the beginning of the fourth quarter. The tremendous decrease in imports from the Far East is chiefly responsible. During the first nine months of 1946, tin imports from the Far East amounted to only 2474 tons, 5 per cent of the prewar average. In prewar days the Orient accounted for almost 75 per cent of the total tin output.



Roll of sheet steel is taken from annealing furnace at Carnegie-Illinois Steel Corp.'s Gary Works, preparatory to being tin plated

From January through September last year tin consumption in the United States amounted to 59,005 tons, compared with 66,564 tons in the comparable 1945 period. The indicated total domestic consumption in 1946 was about 81,000 tons, against 84,535 tons in the whole of 1945.

Imports during the first nine months of 1946 totaled 38,512 tons. A decline of 2613 tons in domestic secondary tin production partially offsets the gain these imports represent over the 32,022 tons brought in in 1945. The United States currently is using tin at about twice the rate it is being imported.

World tin production, however, is scheduled to increase. Total mine output in 1946 is estimated at 94,000 tons and in 1947 is expected to be about 142,000 tons. By 1949, production will reach a rate of 200,000 tons annually, according to the International Tin Research & Development Council, The Hague.

World tin consumption in 1946 is estimated at 137,000 tons and when all restrictions on use are removed the world consumption will rise to a rate of 190,000 tons.

The Civilian Production Administration last week eliminated industry quota restrictions on pig tin use in a general relaxation of pig tin controls. The metal will continue under allocation, but not on a quota basis. Overall first quarter allocations will be between 17,000 and 18,500 tons. Maximum tin content in solders has been raised to 30 per cent from 26 and the specific restriction on tin in jewelry eliminated. Counter to the general relaxation trend, the monthly small order purchase limit has been reduced from 6000 to 4000 lb.

Official concern over a supply of cans for domestic crop preservation this summer and fall is still apparent in all discussions of the matter. There is skepticism in some quarters that foreign claim-

By T. N. SANDIFER
Associate Editor, STEEL

ants will accept the 65,000-ton April-May allocation as a final figure. In the near future, on this assumption, a move is expected to increase the export tin plate allotment. In fact, it was narrowly averted in the recent negotiations here.

Hints Steel Price Drop If Wages Stay Constant

STEEL prices should not increase beyond present levels unless wages are advanced substantially, E. L. Ryerson, chairman, Inland Steel Co., Chicago, told a conference on distribution, sponsored by the Chicago Association of Commerce, last week.

Provided wages remain near present levels, "we may see some adjustments of prices downward in the near future," Mr. Ryerson said.

Mr. Ryerson predicted continuance of near-capacity operations for the steel industry unless a strong recession develops through buyer resistance.

"I think most of us would agree that anything approaching 85 per cent of capacity operations would be a satisfactory outlook and we in the steel industry would settle for such a basis right now." Eighty-five per cent operations over the year would mean production of about 78 million tons of ingots.

"Never in the history of the industry have we seen anything to equal the pressure for advancing delivery schedules and increasing tonnages from every possible user of steel products. Evidently it has been accepted by the trade that offers of premium prices do not produce or obtain more steel and as a consequence every conceivable device from offers of trades of homes to race horses has been employed to get an extra ton," Mr. Ryerson said.

EXITS FASTER: Testimony in the original portal pay suit, the Mt. Clemens Pottery Co. case being heard in federal court at Detroit, took a farcical turn last week as witnesses attempted to tell how long it took them to walk from the time clock to their work posts. Exasperated by the inconsistencies in witnesses' testimony, Judge Picard could conclude only that the average worker moves faster when leaving his job than when approaching it. Shown above in the court chambers are the principal figures in the hearing. Seated, left to right: Edward Lamb, CIO attorney: Federal Judge Frank A. Picard; F. E. Cooper, company attorney. Standing: Nicholas Rothe, CIO attorney; Lowell Goerlich, CIO attorney; John Sonnett and Charles Corbin, both of the Attorney General's office. NEA photo

December Pig Iron Output Cut 10 Per Cent By Coal Strike; 1946 Total Down Sharply

PRODUCTION of pig iron, including ferromanganese and spiegeleisen, declined about 10 per cent in December due to the banking of a number of blast furnaces during the coal strike.

Total output was 3,992,165 net tons compared with 4,434,711 in November and 4,322,996 in December, 1945.

Total output for the year amounted to 45,378,530 tons compared with 54,167,082 in 1945.

The industry operated at 69.9 per cent of capacity in December compared with 80 per cent in November and 67.4 per cent for the full year, compared with 80.5 per cent in 1945.

Blast Furnace Capacity and Production—Net Tons

	Number of companies	Annual blast furnace capacity	Production							
			Pig Iron		Ferro manganese and spiegel		Total		Percent of capacity	
			Current month	Year to date	Current Month	Year to date	Current month	Year to date	Current month	Year to date
Distribution by Districts:										
Eastern	12	12,988,970	737,619	8,312,717	24,684	240,630	762,303	8,553,347	69.2	65.9
Pittsburgh-Youngstown	16	25,939,940	1,494,404	17,457,567	17,589	174,363	1,511,993	17,631,930	68.8	68.0
Cleveland-Detroit	7	6,557,500	400,927	4,900,688	-	-	400,927	4,900,688	72.1	74.7
Chicago	7	14,095,510	899,597	9,717,193	-	-	899,597	9,717,193	75.3	68.9
Southern	9	4,924,670	261,615	3,180,898	6,111	108,736	267,726	3,289,634	64.1	66.8
Western	5	2,836,000	149,589	*1,285,738	-	-	149,589	* 1,285,738	62.2	45.3
Total	37	67,340,590	3,943,781	*44,854,801	48,384	523,729	3,992,165	*45,378,530	69.9	67.4

* Adjusted. Figures by American Iron & Steel Institute.

Steel for 7000 New Freight Cars Monthly To Be Provided by Mills

Voluntary allocation plan calls for 175,000 tons of rolled products every month with program in full swing by April. Move aimed at relieving serious car shortage with good-order cars sufficient for only 75 per cent of potential 1947 demand

VOLUNTARY allocation by the steel mills of sufficient rolled steel products to permit monthly production of 7000 freight cars and rehabilitation of existing rolling stock, was announced last week in Washington following a series of meetings between representatives of the steel industry, the Civilian Production Administration and the Office of Defense Transportation.

The move is aimed at relieving the growing shortage of freight cars which currently is seriously hampering the movement of raw materials and finished goods and threatens to stall industrial operations on a broad front unless corrected. Useful freight car supply dwindled by 50,000 from 1945 to 1946, and like shrinkage between 1946 and 1947 is expected by ODT Director J. Monroe Johnson who told a Senate commerce subcommittee last week that the available supply of good-order cars is sufficient to care for only 75 per cent of potential 1947 demand.

Since the Civilian Production Administration's priority authority expires March 31, except on building materials, voluntary allocation of the car steel was deemed the most feasible way of carrying out the car-building program.

In announcing the allocation plan, the CPA explained that because of the type of steel required the largest producers will necessarily assume the greatest portion of the tonnage load, though all steel companies making the desired products will be expected to contribute to the program proportionate to their respective capacities.

Steel will be scheduled to greatest extent possible during March, with monthly deliveries of 165,000 to 175,000 tons in full effect in April. Car steel shipments in the first nine months of 1946 averaged only 96,000 tons monthly.

No time has been placed on the new program. The allocation plan will operate until the critical need for freight cars and car repairs has been met. Current domestic freight car production averages approximately 3500 units monthly, but retirements because of over-age and repairs are placed at 4500 per month, leaving a net loss of 1000 units monthly.

Some steel producers doubt their ability to supply steel for more than 7000 cars monthly though the ODT is desirous of getting car production up to 10,000 per month. Certainly, it is said, it will be impossible for the mills to meet more than a 7000-car monthly schedule over the next several months since even now some producers are well behind on their commitments to the carbuilders. This is particularly true of platemakers, some of whom are far oversold.

It is doubtful if pressure for plates has ever been stronger though less tonnage is moving than during the war. This is explained by the fact that there is far less capacity now devoted to plate production due to withdrawal of strip mills from this product field. Strip capacity devoted to platemaking during the war more than doubled the nation's platemaking capacity. Plates were needed particularly for shipbuilding during the emergency. Today, however, strip facilities have been reconverted to production of sheets and strip to meet the extraordinary peacetime demand for those products.

Present capacity of the regular plate mills is insufficient to cope with current demand. Certain producers are so far oversold they are canceling substantial portions of future commitments while some others are setting back delivery promises three and four months. The stringency in plates, particularly the light gages, is second only perhaps to that existing in sheets and strip. Small carbon bars also are in very short supply.

Colonel Johnson told the Senate subcommittee that he regretted last week's allocation action hadn't been taken five or six months ago, declaring that CPA aid in getting steel has been too little and too late. He cited numerous instances where ODT had urged CPA to allocate steel to the railroads and carbuilders, but said the records show that though all industry was seriously retarded by car

(*Please turn to Page* 176)

Present, Past and Pending

■ NEW GOLD DISCOVERY REPORTED IN SOUTH AFRICA
LONDON—Another spectacular gold find has been reported from the Orange Free State's new gold mining field in the Union of South Africa. Borehole assays indicate it may be richest find ever made in South Africa.

■ FORD TRACTOR REPORTS NEW PRODUCTION RECORDS
DETROIT—Two new production records set by Ford Motor Co.'s Tractor Division include January output at 8750 units, a new monthly high, and a record output for 1946 of 59,773 units. Ford expects to produce 100,000 units in 1947.

■ PORTSMOUTH STEEL TO HELP MANAGE APOLLO
PORTSMOUTH, O.—Portsmouth Steel Corp. has reached an agreement with Apollo Mfg. Corp., Apollo, Pa., under which it will help manage the latter's plant on a fee basis and will roll sheet bars for Apollo.

■ REPUBLIC, UNION AGREE TO EXTEND CONTRACT
CLEVELAND—Republic Steel Corp. and the United Steelworkers of America-CIO have agreed to extend their labor contract to April 30, following the pattern set by the United States Steel Corp.

■ BUILDING RESEARCH BOARD PLANNED
WASHINGTON—Plans to establish a Building Research Board to serve as a clearing house of technical research information in the building construction field are announced by John C. Stevens, chairman, Construction Industry Advisory Council. Board will be patterned after the existing Highway Research Board.

■ NEW TYPE DROP-HAMMER DEMONSTRATED
CHAMBERSBURG, PA.—New type drop-hammer, in which steam or compressed air lifting replaces the traditional roller-and-board friction lift, was demonstrated last week at an openhouse held by Chambersburg Engineering Co.

Steel Industry's Earnings Show Gain

INDICATION that complete and final figures will put the steel industry's net profit in 1946 more than 40 per cent above that for 1945 is seen in a compilation of preliminary reports from eight steel companies representing 75 per cent of the industry's ingot capacity.

The improved showing was made in the face of a paralyzing strike of steelworkers, two coal mine strikes which choked off the steel industry's fuel supplies, and various other handicaps stemming out of the war and reconversion. In fact, strike expenses shown in some of the steel companies' reports were in eight figures, the United States Steel Corp. noting, for instance, that it had charged up to a special fund $29,200,000 for strikes and certain other war costs. Several other companies reported they too had compensated for strike losses by transferring substantial amounts from a contingency fund set up during the war to provide for possible losses and unforeseen emergencies arising out of the war. Had these transfers not been made, the showing of 1946 over 1945 would not have been so favorable.

An analysis of the steel companies' preliminary reports indicates that no one thing can be cited as chiefly responsible for the increase in 1946 net profit over 1945. From company to company the factors for improvement varied. Some companies reported their total federal taxes for 1946 were considerably less than in 1945, while the reverse was true for others. Among items figuring importantly in helping 1946 net income make a favorable showing were depreciation and depletion, and amortization of war emergency facilities, which in most instances were only a fraction of what they were in 1945.

Preliminary reports of eight companies indicate total net income in 1946 exceeded that of 1945 by more than 40 per cent

Contrast between producing for peacetime consumption rather than for war purposes is reflected vividly by sales figures, which in most instances were considerably lower in 1946 when steel ingot production was only 83 per cent as great as that in 1945.

A summary of preliminary reports on earnings shows that in 1946 eight steel producers with 75 per cent of the industry's ingot capacity had an aggregate net income of $209,924,078, a 46.7 per cent increase over their 1945 total net income of $143,029,173. All but one of those eight companies showed increases over 1945. For the fourth quarter of 1946 the total net income for those eight companies was $70,851,331, just slightly above the third quarter total of $70,003,566, but nearly double the total of $35,687,541 in the final quarter of 1945. Three of the eight companies showed lower net earnings in the fourth quarter of 1946 than in the third quarter, while only one reported a net profit smaller in the last quarter of 1946 than in the last quarter of 1945, as is shown in the accompanying table.

Bethlehem Chairman Sees Industry Wrecked If Portal Pay Demands Are Fully Granted

WHILE optimistic as to steel demand, Eugene G. Grace, chairman, Bethlehem Steel Corp., Bethlehem, Pa., at a press conference following the recent quarterly meeting of the corporation's directors, deplored the mounting number of portal-to-portal pay demands as something which if fully granted would wreck American industry.

Regarding portal demands, he said the demands are completely without merit. In the case of Bethlehem, demands are around $400 million and are still rising, and as they tie in with wages, labor contracts cannot be consummated until the question is clarified.

Bethlehem is going ahead with its day-to-day business and paying its dividends and so forth without regard to this portal threat— "except to fear it."

Commenting further, Mr. Grace remarked that Bethlehem over past years has spent many millions for improved facilities for convenience of its employees. It had bought up whole tracts of land adjacent to some of its plants to provide convenient parking space, had provided good "change" facilities close to jobs, and conveniently located "check-in" facilities, etc. Where lay-out had imposed special difficulty on employees, which possibly could be construed as unfair, it

Summary of Net Profits of Steel Producers

	Year Ended Dec. 31 1946	Year Ended Dec. 31 1945	Fourth Qtr. 1946	Third Qtr. 1946	Fourth Qtr. 1945
United States Steel Corp.	$88,683,530	$58,015,056	$31,215,636	$33,329,353	$13,267,300
Bethlehem Steel Corp.	41,731,931	34,947,116	11,937,281	10,543,005	11,447,858
National Steel Corp.	20,461,651	11,117,764	6,520,381	6,254,976	2,207,091
Republic Steel Corp.	16,003,468	9,543,443	6,539,054	5,039,071	1,569,516
Jones & Laughlin Steel Corp.	10,854,084	8,082,082	4,744,824	2,952,716	2,367,774
Youngstown Sheet & Tube Co.	14,254,905	7,512,250	5,078,510	4,871,852	1,664,635
Inland Steel Co.	14,544,121	9,861,210	4,643,348	4,927,473	2,632,598
Wheeling Steel Corp.	3,360,388	3,950,252	172,347	2,085,120	530,774
Totals	$209,924,078	$143,029,173	$70,851,331	$70,003,566	$35,687,541
Steel Producers with Fiscal Years Ended at Dates Other than Dec 31:					
† Colorado Fuel & Iron Corp.	$ 334,751*	$ 1,954,979	$ 876,310	$ 1,025,126	$ 452,214*
† Keystone Steel & Wire Co.	2,109,951	1,588,209	1,175,391	916,143	537,329
††A. M. Byers Co.	149,530	1,055,126	.....	.....	.....
‡ Lukens Steel Co.	650	2,751,477	360,050	.....	156,929*
§ Northwestern Steel & Wire Co.	617,169	216,313	.....	.....	.....

*Loss. †Year ended June 30. ††Year ended Sept. 30. ‡Year ended Oct. 5. §Year ended July 31.

had long since been corrected, he said.

Contract negotiations between Bethlehem and the United Steelworkers of America are confined at present to non-economic problems, such as grievance procedure and the like. In this general connection, Mr. Grace placed his company on record as still opposed to union "maintenance of membership" clause.

Comparing present peacetime payrolls with those before the war, Mr. Grace said that Bethlehem's payroll in the last quarter of 1946 was $97,400,000 against $49 million in the corresponding period of 1939 and that employment was 140,645 against 109,358. Average hourly earnings, he said, were $1.492, against $0.893.

Mr. Grace said that of the $162,500,000 of new construction authorized at the end of last year, the company hopes to be able to complete $100 million of it this year. Bethlehem, he said, has not received a single complaint from any of its larger customers because of recent price increases, adding that there has been no pressure for reductions.

The new $3 million experimental oxygen plant at Johnstown, Pa., for production of cheap oxygen should be completed by September or October at the latest. This plant, he said, is to be operated by a company, of which Bethlehem has one-third interest, and he believed it will be the first of its kind ever to be put into operation.

Houston Tool Convention To Feature Technical Seminars

Special emphasis will be placed on technical seminars when the American Society of Tool Engineers holds its 15th annual convention Mar. 19-22 at Houston, Tex. Built around the general theme of "more goods, for more people, for less money, while paying higher wages," the Houston meeting will welcome as guest speakers many outstanding industrial figures.

The roster, which is still not complete, will include James F. Lincoln, president, Lincoln Electric Co., Cleveland; F. J. Tone Jr., vice president, Carborundum Co., Niagara Falls, N. Y.; E. V. Flanders, chief engineer, Thread Grinding Division, Jones & Lamson Machine Co., Springfield, Vt.; Harry C. Wiess, president, Humble Oil & Refining Co., Houston, Tex.; A. P. Beutel, vice president and general manager, Texas Division, Dow Chemical Co.; Col. E. E. Drake, president, Gulf Research Development Co., Pittsburgh; Noah Dietrich, vice president, Hughes Tool Co., Houston, Tex.; Philip McKenna, president, Kennametal Inc., Latrobe, Pa.; Col. W. F. Rockwell, chairman of the board, Rockwell Mfg. Co., Pittsburgh.

Blast Furnace Group Discusses Technical Problems at Chicago

Tap hole practice and prospect of blowing oxygen-enriched air into blast furnaces highlight discussions at sessions of Blast Furnace & Coke Association of Chicago District. German and Russian experience provide material for study

CHICAGO

BLAST FURNACE tap hole practice and the prospect of blowing oxygen-enriched air into blast furnaces highlighted technical discussions at the second regular 1946-47 meeting of the Blast Furnace & Coke Association of the Chicago District, Jan. 31 at the Del Prado hotel, Chicago.

In a paper, "Tap Hole Practice in the Chicago District," W. D. Millar, general foreman of blast furnaces, South Works, Carnegie-Illinois Steel Corp., Chicago, presented detailed data collected from operators of the seven local blast furnace plants and from this was able to draw certain general conclusions.

The speaker said good tap hole maintenance is important to economy in blast furnace operation. The problem is principally that of maintaining a long hole. Information he had collected indicated that some plants do not use a mud mix containing coke.

Chemical content, Mr. Millar asserted, does not indicate quality of the mixture, rather it is physical properties that count. Much depends also on size of grind of the clay mix—too fine is not desirable, neither is too coarse.

Correlation of data showed that when furnace hearth is over 23 ft diameter, tap holes should be not less than 5 ft long. Mr. Millar commented that expanding use of beneficiated ores in the future will increase slag in the furnace and this would require even better tap hole maintenance. He suggested that it might serve a useful purpose to set up standards on clays, mixtures, grinding, moisture content, and the like.

In discussion, A. S. Nichols, vice president, Illinois Clay Products Co., Chicago, pointed out that all clays shrink 8 to 15 per cent in drying and burning. The way to combat this is to add calcined material or grog. Some restraint on shrinkage can be obtained by lowering or more accurately controlling water content.

Considerable interest was displayed in the paper "A Short Review of What Is Known About the Prospect of Blowing Oxygen-Enriched Air Into the Blast Furnace," by Kurt Neustaetter, blast furnace engineer, Inland Steel Co., Indiana Harbor, Ind.

Since no work of record has been pursued in the United States, Mr. Neustaetter was obliged to confine his search for information to German and Russian literature. He discovered from the German material, particularly the work of Lennings, that the idea of introducing oxygen into the blast furnace is about 35 years old.

Use of oxygen, it was revealed, decreases furnace top pressure and facilitates stock movement. Figures presented showed that oxygen to the extent of 20.9, 25 and 30 per cent have been introduced in the blast. Combustion temperatures attained were 2069, 2267 and 2487 degrees C., respectively. This causes lower temperatures in the upper part of the furnace and may require introduction of hot gases at some point above the mantle.

Mr. Neustaetter said the higher combustion temperature obtained with oxygen will facilitate melting and result in higher viscosity of slags. Tests showed decreases in coke consumption, increased iron production and less flue dust. However, he pointed out that too large a drop in heat can not be afforded. He also raised the question as to whether oxygen can be produced at sufficiently reasonable cost to justify its use in blast furnaces.

Experimental Plant Under Way

It was revealed that Bethlehem Steel Co. is building an experimental plant in Johnstown, Pa., with a 150-ton blast furnace and facilities for enriching the blast with oxygen.

C. L. Waggoner, general superintendent, Geneva Steel Co., Geneva, Utah, contributed an interesting paper titled "Observations on Coke Oven and Blast Furnace Practices at the Geneva Steel Plant." The paper discussed the availability and quality of raw materials and the necessity for this remotely located plant to develop suitable practices to utilize these materials.

The luncheon meeting was addressed by P. V. Martin, formerly director of industrial relations, Carnegie-Illinois Steel Corp., Chicago, and recently returned from 18 months in Germany where he served as a member of the metals division of the United States Economic Mission advising the military.

Automotive Industry Holds Lead In Receipts of Finished Steel

Construction continues in second place. Rail transportation moves up to third in September, displacing containers. Warehouses receive 17.7 per cent for month and 18.3 per cent in first nine months

MANUFACTURERS of automobiles, trucks, parts and accessories continued in first place as steel consumers in September as well as in the first three quarters of 1946.

The automotive industry, excluding tractors, received 12.6 per cent of September shipments of 4,569,402 net tons, according to figures compiled by the American Iron & Steel Institute. For the nine months, the automotive industry received 3,823,833 net tons, or slightly more than 11 per cent of the total of 34,191,052 tons.

Construction continued in second place in September and for the first nine months of 1946. In third place in September was rail transportation, which nosed out the container industry. Containers, however, are the third largest consumer for the first nine months, with rail transportation fourth.

Warehouses received 17.7 per cent of finished steel shipments in September, or 810,600 net tons. For nine months, the distributors received 18.3 per cent of total mill shipments.

For the first nine months, the consuming industries ranked, in order of tonnage taken, as follows: 1. Automotive; 2. construction; 3. containers; 4. rail transportation; 5. machinery, industrial equipment and tools; 6. contractors' products; 7. domestic and commercial appliances; 8. appliances, utensils and cutlery; 9. electrical equipment and machinery; 10. agricultural equipment; 11. shipbuilding; 12. oil and gas drilling; 13. mining, quarrying and lumbering; 14. ordnance and other military; 15. aircraft. These 15 classifications exclude warehouses, converters and processors and exports.

Steel Distribution, Nine Months, 1946

(Leading products of all grades, including alloy and stainless)

Market Classification	Net Total, All Products (in net tons)
Converting and Processing	2,808,932
Jobbers, Dealers, Distributors	6,343,877
Construction, Maintenance	3,167,529
Contractors' Products	1,065,887
Automotive, excl. Tractors	3,823,833
Rail Transportation	2,577,524
Shipbuilding	196,273
Aircraft	17,245
Oil, Gas Drilling	165,298
Mining, Quarrying, Lumbering	129,412
Agricultural	721,655
Machinery, Industrial Equip., Tools	1,564,092
Elect. Mach., Equip.	772,639
Appliances, Utensils, Cutlery	851,839
Other Domestic, Commercial Appliances	949,571
Containers	2,987,584
Ordnance, Other Military	25,958
Unclassified	4,002,333
Export	2,019,571
Total	34,191,052

National Tube President Sees Tight Steel Market

Even if the steel industry succeeds in reaching and maintaining capacity production during 1947, demands for steel cannot be fully met this year, John E. Goble, president, National Tube Co., United States Steel Corp. subsidiary, said while in Dallas, Tex., for the first postwar sales meeting of the National Tube Co.'s southwestern staff.

The increase in demand brought about by the expansion of the nation's plant capacity and the curtailment of 1946 output caused by strikes were cited by Mr. Goble as the two main factors responsible for the shortage of steel.

National Tube is operating at about 97 per cent of capacity or slightly above the industry's overall rate.

A modernization and improvement program, expected to cost $85 million is now under way by National Tube. The program includes construction of two mills for seamless, two and four-inch pipe at Lorain, O., and Gary, Ind. Both plants are expected to be in operation in 1948.

Distribution of Steel Products—September, 1946

(In net tons of leading products of all grades of steel, including alloy and stainless)

Market Classification	Shapes	Plates	Hot-Rolled Bars	Cold-Finished Bars	Seamless Tubing	Drawn Wire	Hot-Rolled Sheets	Cold-Rolled Sheets	Coated Sheets	Hot-Rolled Strip	Cold-Rolled Strip	Total (All Products)
Converting and Processing	5,266	34,413	166,945	22,683	11,176	68,917	55,899	2,449	497	27,762	7,588	808,833
Jobbers, Dealers, Distributors	83,130	63,554	95,212	46,009	67,087	14,049	78,043	34,843	39,426	10,280	4,431	810,600
Construction, Maintenance	137,490	78,997	22,343	269	25,696	1,870	23,655	3,486	14,021	6,068	1,833	419,352
Contractors Products	1,189	9,136	11,838	1,115	4,820	1,783	47,196	28,266	29,760	6,423	4,580	159,431
Automotive, excl. Tractors	3,840	18,570	132,156	22,009	2,292	15,004	140,310	147,127	6,996	44,180	20,460	577,382
Rail Transportation	36,966	58,952	29,256	510	824	193	17,594	1,299	4,443	2,238	462	377,090
Shipbuilding	6,350	19,324	2,048	150	268	70	754	189	283	55	.....	30,030
Aircraft	.....	115	77	750	173	26	256	131	169	268	197	2,347
Oil, Gas Drilling	2,337	5,905	6,796	463	3,962	3	330	5	54	66	.....	24,121
Mining, Quarrying, Lumbering	838	2,526	4,199	88	1,452	122	1,389	154	51	97	28	16,377
Agricultural	3,032	4,832	37,241	6,280	400	2,522	10,988	4,616	8,757	9,218	430	93,810
Machinery, Industrial Equipment, Tools	17,606	48,240	53,201	24,214	11,850	7,428	20,934	4,284	1,322	9,885	3,958	224,249
Elect. Mach., Equip.	2,179	6,987	7,746	3,467	219	3,036	15,395	7,108	1,795	5,656	4,489	99,476
Appliances, Utensils, Cutlery	117	1,882	984	3,177	565	3,330	16,482	40,436	6,848	2,704	6,151	103,670
Other Domestic, Commercial Equipment	2,494	8,514	6,913	4,085	259	20,784	20,724	26,593	3,621	8,522	10,584	122,245
Containers	.....	12,689	1,472	3	121	7,021	46,764	15,528	3,173	13,790	8,006	336,549
Ordnance, Other Military	54	72	105	89	107	.....	21	3	.....	.....	3	582
Unclassified	22,010	16,325	89,642	.....	44,686	3,596	54,651	48,503	7,211	2,316	40,725	514,053
Export	22,246	26,459	13,901	1,403	8,023	36,561	13,143	6,820	4,951	5,611	835	274,180
Total	347,144	417,492	682,075	136,764	183,980	186,315	564,508	371,840	133,378	156,139	114,760	4,994,377
Less shipments to members of industry for conversion	303	22,083	73,007	11,034	10,751	12,848	36,629	55	120	19,048	2,572	424,975
Net Total	346,841	395,409	609,068	125,730	173,229	173,467	527,879	371,785	133,258	137,091	112,188	4,569,402

Plans Projected For Machine Tool Show at Chicago

National Machine Tool Builders' Association sponsors exposition to be held Sept. 17 through 26

THE 1947 Machine Tool Show, one of the largest expositions of a single industry, will be held in Chicago Sept. 17 through 26, it was announced last week by Herbert H. Pease, president, National Machine Tool Builders' Association.

Latest designs in metalworking machinery—new methods, new materials and new products—will be shown. Theme of the show is "More goods for more people at lower prices".

The show will occupy 500,000 sq ft in the Dodge-Chicago plant near the Chicago airport. More than 250 exhibits of machine tools, forging machines and other metalworking equipment will be shown in operation.

Three previous shows have been held by the association. These took place in Cleveland in 1927, 1929 and 1935. The 1935 show was attended by some 60,000 executives and technological experts.

Admission will be by invitation. For the convenience of visitors, advance registration will be arranged by the association, through its offices at 10525 Carnegie Avenue, Cleveland 6.

Each evening during the show there will be technical sessions of the Machine Tool Congress at various Chicago hotels.

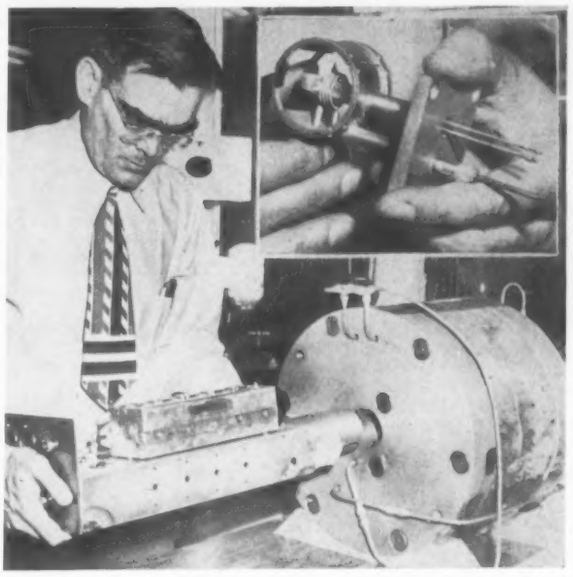
Members of the Machine Tool Show Committee are Swan E. Bergstrom, chairman; William L. Dolle, R. W. Glasner, Helge G. Hoglund, Ralph I. Kraut, and Louis Polk. Clapp & Poliak, New York, are show managers.

Output of Stainless Steel Seen Hitting Record High

Predicting that "stainless steel will set a new all-time high record in 1947, both for production volume and methods of application," Walter D. Monroe, president, Chicago Steel Service Co., Chicago, last week stated that "barring unforeseen work stoppages this year, the steel industry should produce somewhere between 600,000 and 700,000 ingot tons" of stainless.

Impetus to demand for stainless grew during the war, Mr. Monroe said, "for reasons other than the well-known advantages of eye appeal and greater resistance to rust and corrosion." Some of these advantages, as listed by Mr. Monroe, are: High creep strength, or ability to retain strength at high temperatures; uniform ductility as well as a high strength-to-weight ratio.

Mr. Monroe said that the largest peacetime users, in order of their importance, are: Automotive, kitchen accessories, food processing equipment, transportation, mechanical refrigerators and manufacturers of agricultural, brewery and petroleum refinery equipment.



FOR ATOM STUDY: This "nuclear induction" machine, built by Stanford University scientists, is expected to yield valuable information about atomic particles, and at the same time may prove useful as a quick practical method of chemical analysis. Inset shows heart of the device. The two coils, with a sample of the element to be investigated in a glass vial inside the inner coil, are placed in a strong magnetic field. An electric current is applied to outer coil. At a certain frequency, characteristic for each element, the particles in the nucleus will begin to spin, inducing a corresponding high frequency current in the smaller coil. NEA photo

Gain in Special Tool Shipments Reflects Manufacturers' Efforts To Reduce Costs

DOLLAR value of dies, tools, molds and other special tooling shipped during the last two months of 1946 ran nearly one-fourth above that of the like period in 1945, according to the National Tool & Die Manufacturers Association. This covers the specially designed equipment used in "tooling up" standard machinery to produce new models. December shipments were the highest of any month of the fourth quarter.

This 24 per cent rise in shipments indicates substantial increase in volume, the association points out, since nation-wide reports show the general price levels on tool and die work fall short of reflecting increases in costs.

"This means that manufacturers of metal and plastic articles are banking on tooling up more intensively to cut their labor costs," said George S. Eaton, executive secretary of the tool and die organization. "It also means that the approach of keener competition is causing some of them to go ahead with preparations to bring out postwar models, in spite of labor and material uncertainties."

Orders in December showed a 15 per cent decline from November.

Because of the trend toward more elaborate tooling as a means of lowering production costs, Mr. Eaton looks for a gradual rise in tool shop operations. He points out volume of special tooling is an excellent barometer of future business, as tooling orders must precede by months the time when a factory can begin to turn out any new model. And if a serious recession is in prospect, he says that the output of dies and tools cannot be expected to continue its recent increase.

At the recent two-day quarterly directors' meeting of the National Tool & Die Manufacturers Association in Cleveland, collective bargaining problems were discussed, the discussion emphasizing the necessity of paying special attention to small business in any legislation that may be adopted.

The association's 1947 annual meeting will be held Nov. 2-5 at the Benjamin Franklin Hotel, Philadelphia.

SURPLUS GOVERNMENT STEEL PLANTS SOLD TO PRIVATE INDUSTRY

War Operator	Cost	Sale Price	Purchaser
Carnegie-Illinois Steel Corp. (Three plants) Duquesne, Homestead, Braddock, Pa.	$120,181,621	$65,013,200	Carnegie-Illinois Steel Corp.
Geneva Steel Co., Geneva, Utah	191,210,307	47,500,000 (Including inventories)	U. S. Steel Corp.
Jones & Laughlin Ore Co., Benson Mines, N. Y.	6,914,122	4,000,000	Jones & Laughlin Ore Co.
Sheffield Steel of Texas (part of) Houston, Tex.	3,010,894	1,479,802	American Rolling Mill Co.
Inland Steel Co., East Chicago, Ill.	34,268,420	13,250,000	Inland Steel Co.
American Steel & Wire Co., Duluth, Minn.	7,601,556	1,835,400	American Steel & Wire Co.
Pittsburgh Steel Co., Allenport, Pa.	763,705	361,996	Pittsburgh Steel Co.
Republic Steel Corp., South Chicago, Ill.	91,608,795	35,000,000	Republic Steel Corp.
Babcock & Wilcox Tube Co., Beaver Falls, Pa.	995,861	443,465	Babcock & Wilcox Tube Co.
Alliance, O.	2,824,395	1,315,794	Babcock & Wileox Tube Co.
Timken Roller Bearing Co., Newton Falls, O.	1,365,009	685,000	Standard Steel Spring Co.
Brown Fence & Wire Co., Adrian, Mich.	165,432	109,578	Service Steel Co., & Brown Fence & Wire Co.
Plymouth Steel Co., Detroit, Mich.	49,141	47,323	Plymouth Steel Co.
Wallington Tube Co., Wallington, N. J.	1,991,219	903,000	Wallington Tube Co.
Pacific Tube Co., Los Angeles, Calif.	2,494,582	1,665,000	Pacific Tube Co.
Shasta Coal Corp., Bicknell, Ind.	1,384,501	1,119,567	Shasta Coal Corp.
Tennessee Products Co., Chattanooga, Tenn.	1,697,039	600,000	Tennessee Products Co.
Basic Refractories, Inc., Maple Grove, O.	1,080,898	600,000	Basic Refractories, Inc.
Gladding-McBean & Co., Lehi, Utah	599,679	375,000	General Refractories Co.
Associated Iron & Metals Co., Oakland, Calif.	74,249	41,750	Associated Iron & Metals Co.
California Scrap Iron Co., Pittsburg, Calif.	74,318	41,100	California Scrap Iron Co.
Cooper Alloy Foundry Co., Hillside, N. J.	351,067	132,500	Cooper Alloy Foundry Co.
Farrell-Cheek Steel Co., Sandusky, O.	691,219	250,000	Farrell-Cheek Steel Co.
Michigan Steel Castings Co., Detroit	171,793	106,106	Michigan Steel Castings Co.
Ordnance Steel Foundry, Bettendorf, Iowa	3,470,820	1,049,139	Bettendorf Co.
The Osgood Co., Marion, O.	253,584	128,416	The Osgood Co.
Roxbury Steel Casting Co., Roxbury, Mass.	696,246	150,000	E. J. Belkin
Zimmerman Steel Casting Co., Bettendorf, Iowa	331,696	190,000	The S. & W. Corp.
Gunite Foundries Corp., Rockford, Ill.	195,044	107,209	Gunite Foundries Corp.
Joshua Hendy Iron Works, Sunnyvale, Calif.	2,847,603	1,103,295	Joshua Hendy Iron Works
Maryland Sanitary Mfg. Co., Baltimore, Md.	1,674,118	600,000	Baltimore Castings Co.
General Malleable Corp., Waukesha, Wis.	905,420	550,000	International Harvester Co.
General Motors Corp., Danville, Ill.	2,261,761	1,587,910	General Motors Corp.
Chambersburg Engineering Co., Chambersburg, Pa.	350,848	159,948	Chambersburg Engineering Co.
Die Typing Corp., Pontiac, Mich.	297,778	92,617	Budd Wheel Co.
Utica Drop Forge & Tool Corp., Utica, N. Y.	282,671	136,904	Utica Drop Forge & Tool Corp.
Philadelphia Armor Plate Plant No. 1, Philadelphia, Pa.	709,954	300,000	Henry Disston & Sons, Inc.
Beryllium Corp. of Penna., Reading, Pa.	1,646,135	788,210	Beryllium Corp. of Penna.
Electro Metallurgical Co., Ashtabula, O.	9,003,634	5,150,000	Electro Metallurgical Co.
Superior Tube Co., Norristown, Pa.	534,374	435,000	Superior Tube Co.
Tennessee Products Co., Rockwood, Tenn.	597,817	200,000	Tenn. Products Co.
William B. Pollock Co., Youngstown, O.	160,000	60,000	William B. Pollock Co.
TOTAL	$497,789,325	$189,664,229	

Surplus Steel Plant Disposal Progressing

WAA reports 62 out of 146 projects now in hands of private industry under sale or lease

DISPOSAL of government-owned steel projects, based on cost, has passed the 63 per cent mark, the War Assets Administration announced last week, reporting 62 out of 146 surplus projects as now being in the hands of private industry under sale or lease.

Forty-four projects which cost the government $497,789,325 have been sold. Eighteen costing $82,244,895 have been leased. This makes a total government investment of $580,034,220 in such undertakings.

Still to be disposed of are 84 surplus steel plants which cost $327,444,797. In addition, there are 63 Army-Navy and other projects under long term lease in the steel industry which cost $311,390,492 and have not as yet been declared surplus.

Sales prices are only on such part of the projects disposed of, while the cost prices are on entire projects.

The list of steel projects sold and leased are shown in accompanying tables. Projects still up for disposal are as follows:

PROJECTS REMAINING FOR DISPOSAL

Eighty-four projects already declared surplus, remain, as of Feb. 1, 1947, to be sold or leased by War Assets Administration. They are:

War Operator	Cost
American Rolling Mill Co. (3 plants) Middletown, O.	$ 920,800
	784,899
	403,807
American Rolling Mill Co., Ashland, Ky.	74,700
Columbia Steel Co., Ironton, Utah	13,074,429
Columbia Steel Co., Dragerton, Utah	5,112,372
Crucible Steel Co. of America, Midland, Pa.	2,946,800
Pittsburgh Steel Co., Monessen, Pa.	7,152,197
Republic Steel Corp., Cleveland	28,053,292
Warren, O.	7,393,514
Youngstown	9,182,946
Gadsden, Ala.	12,110,245
Canton, O.	293,000
Warren, O.	1,097,000
Sheffield Steel of Texas, Houston, Tex.	18,370,472
Jacksonville, Fla.	987,059
McAlester, Okla.	6,034,470
Alan Wood Steel Co., Ringwood, N. J.	3,921,996
Youngstown Sheet & Tube Co., Indiana Harbor, Ind.	1,885,300
Allegheny Ludlum Steel Corp., Dunkirk, N. Y.	4,740,300
Babcock & Wilcox Tube Co., Beaver Falls, Pa.	163,400
Copperweld Steel Co., Warren, O. (4 projects)	9,560,745
	636,283
	1,772,875
	6,942,612
Rotary Electric Steel Co., Detroit, Mich.	1,209,185
Superior Drawn Steel Co., Monaca, Pa.	280,552
Scotia Mining Co., Scotia, Pa.	763,500
Koppers United Co., Granite City, Ill.	8,075,563

Lone Star Steel Co., Daingerfield, Tex.	24,214,390
McCrossin Engineering Co., Rusk, Tex.	1,835,600
Wilkeson Products Co., Tacoma, Wash.	963,630
Wilkeson, Wash.	436,566
McLain Fire Brick Co., Wellsville, O.	247,356
Silica Products Oregon, Ltd., Eugene, Ore.	156,000
American Steel Foundries, Indiana Harbor, Ind.	26,137,759
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.	1,448,000
Bison Castings, Inc., Buffalo	280,000
Blaw Knox Co., Pittsburgh	2,146,853
Chapman Valve Mfg. Co., Indian Orchard, Mass.	3,735,000
Columbia Steel Co., Pittsburg, Calif.	8,485,907
Continental Foundry & Machine Co., East Chicago, Ind.	2,230,582
Wheeling, W. Va.	1,275,070
Coraopolis, Pa.	2,479,800
East Chicago, Ind.	5,806,600
Crucible Steel Castings Co., Milwaukee, Wis.	2,041,500
General Alloys Co., Boston, Mass.	125,500
Key Co., East St. Louis, Ill.	1,788,522
Lakey Foundry & Machine Co., Muskegon, Mich.	431,937
Lehigh Foundries, Inc., Easton, Pa.	1,461,302
McConway & Torley Corp., Pittsburgh	1,247,900
National Erie Corp., Erie, Pa.	542,122
Ohio Steel Foundry Co., Lima, O.	3,785,759
Springfield, O.	2,021,506
Lima, O.	174,699
Omaha Steel Works, Omaha, Neb.	641,430
Otis Elevator Co., Buffalo	3,245,993
Pacific Chain & Mfg. Co., Portland, Ore.	354,000
Pittsburgh Steel Foundry Co., Glassport, Pa.	6,689,400
Scullin Steel Co., (2 Plants) St. Louis	3,099,577
	12,627,211
Shofner Iron & Steel Works, Portland, Oreg.	314,000
Symington-Gould Corp., Rochester, N. Y.	3,340,843
Pacific Car & Foundry Co., Renton, Wash.	2,920,761
General Metals Corp., Oakland, Calif.	1,990,000
Campbell-Wyant & Cannon Foundry Co., Muskegon, Mich.	2,864,000
Buffalo Brake Beam Co., Buffalo	870,000
Lake City Malleable Co., Inc., Ashtabula, O.	4,873,667
Barium Steel Corp., (2 Plants) Canton, O.	716,300
	568,000
Champion Machine & Forging Co., Cleveland	3,826,989
Pittsburgh Forgings Co., Coraopolis, Pa.	262,068
Wyman Gordon Co., Harvey, Ill.	11,894,506
(4 Plants) Worcester, Mass.	1,720,838
	1,063,000
	1,114,000
	49,000
Struthers-Wells Corp., Titusville, Pa.	2,098,000
Pittsburgh Ferromanganese Co., Chester, Pa.	1,148,762
Pittsburgh Metallurgical Co., Charleston, S. C.	1,000,407
Wenatchee Alloys, Inc., Rock Island, Wash.	1,461,163
Commercial Shearing & Stamping Co., Youngstown	507,816
Lukenweld, Inc. Coatesville, Pa.	3,210,893
National Carbon Co., Columbus, Tenn.	3,528,000
Total	$327,444,797

WAA Offering $26 Million Foundry for Sale or Lease

Offers for sale or lease of the $26 million government-owned surplus cast armor and steel castings plant in East Chicago, Ind., are now being accepted by War Assets Administration, Chicago, and will be opened publicly Feb. 17. The giant foundry was operated during the war by American Steel Foundries, but when the plant was put up for sale or lease last Oct. 7, no bids were received.

SURPLUS GOVERNMENT STEEL PLANTS LEASED TO PRIVATE INDUSTRY

War Operator	Cost of Leased Projects	Lease Term	Lessee
Sheffield Steel of Texas, Houston, Tex.	$ 819,415	20 years	Sheffield Steel of Texas
Sheffield Steel of Texas, (Part of second plant) Houston, Tex.	10,557,491	20 years	Sheffield Steel of Texas
Granite City Steel Co., Granite City, Ill.	12,697,088	5 years	Granite City Steel Co.
Jessop Steel Co., Washington, Pa.	1,569,148	5 years	Jessop Steel Co.
Zuni Milling Co., Los Lunas, N. Mex.	259,608	2 years	Zuni Milling Co.
Atlantic Steel Castings Co., Crum Lynne, Pa.	1,051,536	5 years	Chester Electric Steel Co.
Auto Specialties Mfg. Co., Benton Harbor, Mich.	3,713,595	5 years	Auto Specialties Mfg. Co.
Hercules Mfg. Co., Centerville, Iowa	165,586	4½ years	Batavia Metal Products, Inc.
Ohio Steel Foundry Co., Lima, O.	3,727,517	3 years	Ohio Steel Foundry Co.
Unitcast Corp., Toledo, O.	3,520,573	5 years	Unitcast Corp.
Albion Malleable Iron Co., Albion, Mich.	1,883,256	5 years	Albion Malleable Iron Co.
United Engineering & Foundry Co., Newcastle, Pa.	25,160,497	3 years	United Engineering & Foundry Co.
Kropp Forge Co., Chicago	2,136,298	5 years	Kropp Forge Co.
Ladish Drop Forge Co., Cudahy, Wis.	10,349,804	5 years	Ladish Drop Forge Co.
Utica Drop Forge & Tool Co., Utica, N. Y.	701,294	5 years	Utica Drop Forge & Tool Co.
Canton Drop Forge Co., Canton, O.	3,102,176	5 years	Canton Drop Forge Co.
Southern Ferro Alloy Co., Chattanooga, Tenn.	130,013	2 years	Southern Ferro Alloy Co.
Pittsburgh Coke & Chemical Co., Neville Island, Pittsburgh	700,000	3 years	Pittsburgh Coke & Chemical Co.
Total	$82,244,895		

Of the 40 steel foundries constructed by the government during the war, the East Chicago facility has the greatest floor area—1,284,500 sq ft in the main building—and the second largest capacity—108,000 tons per year.

Electric Boat Co. Leases War Plant Near Montreal

Electric Boat Co., New York, has taken over the plant of Canadair Ltd., at Cartierville near Montreal, on a lease agreement basis. Under terms of the agreement, the New York company also acquires all manufacturing facilities and the rights to manufacture the North Star transport aircraft which had been jointly created by the Canadian government and Douglas Aircraft Co. Inc. of Santa Monica, Calif. H. Oliver West, until recently vice president of Boeing Aircraft Co., Seattle, will be president and general manager of Canadair Ltd., while John J. Hopkins, vice president of Electric Boat Co., will be the new chairman of the board of directors. The plant was built and equipped in war time at a cost of approximately $15 million.

Lustron Corp. Receives Loan, Leases War Plant

Lustron Corp., Chicago, expects to be producing porcelain enamel steel houses in substantial number by July, Carl Strandlund, president, said recently. His remarks followed action of Reconstruction Finance Corp. in approving a loan of $12,500,000 to his company and approval of War Assets Administration on a lease of the Curtiss-Wright Corp. aircraft plant at Columbus, O.

Supplementing these two announcements, Housing Expediter Frank R. Creedon said the government will guarantee a market for about 15,000 of the Lustron houses. Lustron expects to make 2700 units a month once full production is reached. The government loan will not be disbursed until Lustron has put $3,500,000 of its own money in the project. Of the government money, $4,885,000, is to be used for machinery, equipment and tools, and the remaining for working capital.

Operator Enters Sole Bid For East Chicago Foundry

Continental Foundry & Machine Co., East Chicago, Ind., was sole bidder recently for the surplus steel foundry which it built for the government during the war and has operated since on an interim lease. The company offered War Assets Administration $265,500 for the four buildings comprising the plant and $85,000 for machinery and equipment. The foundry adjoins Continental's main plant in East Chicago.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

Republican leaders aim at Mar. 31 as deadline for new labor legislation. Want restrictive law on books in time to prevent another coal strike. Ban on boycotts likely to be included in new measure

MARCH 31 has been set by the Republican leaders in Congress as the deadline for new labor legislation. While several factors influence their desire for early action on these measures the primary consideration is to obtain restrictive laws in time to prevent John L. Lewis from calling another coal strike in April.

In the House, Chairman Fred H. Hartley of the Education & Labor Committee expects to report out a bill no later than Mar. 15. Representative Hartley's chief concern is not in getting prompt action from the House, but in evolving a bill "that can be passed over a veto." In addition to conducting its own hearings, the House committee is observing closely what is going on in the hearings of the Senate Labor & Welfare Committee. For it is in the Senate that organized labor will wage its most effective fight against restrictive legislation.

Members of the Senate committee, to date, have been impressed with widespread endorsement of the provisions of the revised Case bill—now known as the Ball-Taft-Smith bill. This is the measure that would delay serious strikes 60 days after a new National Mediation Board took them in hand. It would compel filing of union financial reports, outlaw boycotts and jurisdictional disputes, outlaw organization of foremen for collective bargaining and make unions suable for breach of contracts. The committee also has given evidence that a number of its members, at least, strongly favor doing away with industry-wide bargaining, with its attendant strikes that cripple the overall economy.

Large Majority Wanted

What form the final Senate bill will take cannot now be foreseen. Chairman Taft of the Senate committee is keen about reporting a bill which will have majority support from the committee and which can pass the Senate over a veto. To get it he undoubtedly will have to abandon some provisions favored by the Republican leadership.

Of the various provisions under the study, outlawing of the boycott now appears to have the strongest chance of adoption. Some telling testimony on this subject was put in the record, including the full story about the manner in which the International Brotherhood of Electrical Workers-AFL uses it to control the lighting fixture business. The man who told it was R. Stafford Williams, president, National Electrical Manufacturers Association.

Armed with sworn affidavits and letters from manufacturers, and with photostats of letters from officers of local IBEW unions, he showed that many electrical manufacturers are excluded from the country's best markets, or admitted to those markets on terms imposed by IBEW locals. Of this boycott policy, he said, there has been no concealment since the Supreme Court, in the Allen-Bradley Co. case, ruled that restraints by unions, when they act independently rather than in alliance with manufacturers and contractors, are not violations of the Sherman Act.

Lighting fixtures that do not carry the IBEW label are boycotted in San Diego, Minneapolis, St. Paul, Ft. Worth, Chicago, Kansas City, St. Louis, New Orleans, New York, Washington, Philadelphia, and throughout the states of Massachusetts and Rhode Island.

Boycotts Product of Rival

Producing a sworn statement signed by Hoyt P. Steele, vice president, Benjamin Electric Mfg. Co., Des Plaines, Ill., Mr. Williams told how the IBEW locals boycott that company's fluorescent lighting fixtures because its employees are members of a CIO union. For a time, the IBEW permitted its members to install Benjamin fixtures if the company had them rewired by IBEW contractors; that operation often increased the cost of the fixtures by 500 per cent. This arrangement, said Mr. Williams, has been discontinued, and the boycott against Benjamin now is in full force.

To show that a manufacturer is not safe even when he has a contract with an IBEW local and uses the IBEW label on his product, Mr. Williams produced a letter signed by Kurt Versen, Kurt Versen Co., Englewood, N. J., showing that the IBEW local in New York city refused to install Versen fixtures in that important area, thus "maintaining a monopoly in that city, even to the extent of banishing products of its own union in another city."

Individual members of the IBEW have no choice in this matter, said Mr. Williams; the boycott policy is laid down by the union's national office and the individual member must comply under penalty of fine or expulsion. He recited a case where a Chicago contractor rewired and installed some fixtures not bearing the IBEW label. When the union officers learned of this incident, they fined the contractor and each of the offending workmen $100.

On other issues opinion still is in the making. For example, there is some objection to the proposal to establish a new National Mediation Board; some congressmen fear it would set up another bureaucracy and inject the government permanently into the labor disputes business. There also is division of opinion on the matter of foremen's unions. Some congressmen think the foremen should be allowed to organize for bargaining purposes—provided they do not belong to the same union as the workers. Others think the issue should be left to the courts. However, a brief filed by H. Parker Sharp, general counsel for the Jones & Laughlin Steel Corp. has provided food for thought.

"The experience which the corporation has had in its coal mines since the unionization of its supervisors amply proves the correctness of the Biblical statement that 'No man can serve two masters.' It is impossible for the supervisors to remain loyal to the management group and at the same time please the miners with whom they are affiliated," said Mr. Sharp.

It is quite noticeable that the old fear of labor union leaders no longer is felt by government officials. The changed attitude crops up more and more frequently. A good example occurred when Theodore P. Wright, Civil Aeronautics administrator, told the House Commerce Committee that union rules hamper air safety. Prestige of union leaders is at the lowest ebb since Franklin D. Roosevelt entered the White House—so that there was general surprise when the name of CIO's Philip Murray appeared on the list of guests at a White House dinner in honor of Senator Vandenberg.

Grant Patent Concessions

War and Navy procurement officials have made two important concessions to contractors who for the past year have been seeking more liberal patent treatment in connection with research and development work. They have agreed to exempt subcontractors from the necessity of giving the government a license on any discovery developed during the course of work on a government subcontract. To get such exemption, however, it is

necessary to get specific approval beforehand for each subcontractor and the exemption must be obtained in written form from the procurement officer.

While this action represents a distinct easement from the former policy of requiring licenses from subcontractors without exception, most contractors complain the new arrangement is not yet liberal enough. They point out that a lot of subcontracting is required to fulfill the average research and development contract, and they claim that injection of patent clauses in subcontracts adds to the complications of doing business with subcontractors. What the contractors want is blanket patent exemption in all subcontracts.

The services have reached agreement in principle to a modification of the present sweeping clause requiring the contractor to give the government a license on any discovery "conceived or first actually reduced to practice in the performance of this contract." Under the modification, a license need be given only when the discovery relates specifically to the subject of the contract. Under the policy hitherto in effect, a contractor was obligated to give to the government a license covering every discovery made during the life of the contract.

Johnson Directs Labor Bureaus

All operative and administrative responsibility in the Labor Department has been placed in the hands of Undersecretary Keen Johnson. Secretary Schwellenbach has assigned to him "full administrative responsibility for directing organization and management activities of the department's bureaus."

At the same time, Secretary Schwellenbach has set up a new committee which "shall assist the secretary in determining the current and long-range policy of the department." This committee consists of Mr. Johnson, and Assistant Secretaries John W. Gibson, Philip Hannah and David A. Morse.

Collyer Heads Advisory Group

John L. Collyer, president, B. F. Goodrich Co., Akron, O., has been made chairman of the Business Advisory Council, Department of Commerce, for 1947. The following have been elected as vice chairmen: Marion B. Folsom, treasurer, Eastman Kodak Co., Rochester, N. Y.; Frederick V. Geier, president, the Cincinnati Milling Machine Co., Cincinnati; James S. Knowlson, chairman, Stewart-Warner Corp., Chicago; and Robert T. Stevens, chairman, J. P. Stevens & Co. Inc., New York.

New members of the Business Advisory Committee are: Charles S. Cheston, Philadelphia; Fred Rogers Fairchild, Knox professor of economics emeritus, Yale University, New Haven, Conn.; Henry Ford II, president, Ford Motor Co., Dearborn, Mich.; F. H. Haggerson, president, Union Carbide & Carbon Corp., New York; John Holmes, president, Swift & Co., Chicago; Austin S. Igleheart, president, General Foods Corp., New York; Emory Scott Land, president, Air Transport Association of America, Washington; Fred Lazarus Jr., president, Federated Department Stores Inc., Cincinnati; George H. Love, president, Pittsburgh Consolidated Coal Co. Inc., Pittsburgh; H. Lee Marshall, chairman, Continental Baking Co. Inc., New York; B. Moreell, president, Turner Construction Co., New York; John C. Virden, chairman, John C. Virden Co., Cleveland; Langbourne M. Williams Jr., president, Freeport Sulphur Co., New York; Charles E. Wilson, president, General Motors Corp., Detroit.

JOHN L. COLLYER

Mr. Collyer served as special director of rubber programs in the War Production Board in 1945, and served as adviser to the State Department in international rubber meetings in 1944, 1945 and 1946. He was given the War Department's Medal of Merit last Dec. 18. He is a trustee of the Committee for Economic Development and a director of J. P. Morgan & Co. As chairman of the Business Advisory Council, he succeeds G. M. Humphrey, president, M. A. Hanna Co., Cleveland.

War Contracts Mostly Settled

Task of settling terminated war contracts, once attended by so many difficulties, virtually has been completed. On Dec. 31, according to Secretary of the Treasury John W. Snyder, more than 99 per cent of the 318,866 terminated war contracts had been settled. In terms of the $64.5 billion of canceled commitments involved, 94 per cent had been settled.

"Thus," says Mr. Snyder in his report, "this tremendous job in the reconversion of American industry from war to peace has been practically completed in 2 1/2 years after the passage of the Contract Settlement Act and less than a year and a half after V-J Day."

Settlement of the small remaining percentage of terminations will require considerable time, according to Mr. Snyder. Included in the remaining part of the task are "time-consuming activities related to the contract settlement program but not reflected in the figures on prime contract settlements. Among these are exclusions from earlier settlements, facilities contracts, the consolidation and closing of settlement offices, and the final review of settlement files."

The report shows that by the end of 1946 plant clearances on $7.3 billion of inventory had been completed; this represents 96 per cent of the total plant clearance task.

The offer of the government to provide interim financing to terminated contractors was widely accepted. Payments under this plan came to $3 billion of which $254 million were outstanding on Dec. 31. Adequate interim financing continued to be available.

Out of the 318,866 terminated contractors, only 158 brought their cases before the Appeals Board with requests for more favorable treatment, and 18 of these cases were subsequently withdrawn.

Seek Tools for Storage

Following a good deal of preparatory work, teams of qualified Army-Navy-Air Forces officers on Feb. 1 began to search War Assets Administration warehouses to locate and tag surplus machine tools to be put away in long-time storage. They are to be held for use in the event of another military emergency, and to save the time that would be required to produce these tools or their equivalent.

The teams are working against a list of about 80,000 tools recently compiled for the Army and Navy Munitions Board. The number to be put in storage will depend on two factors. One is the number of the desired tools which can be found in warehouse stocks. The other is the amount of money which Congress decides to allocate for storage of machine tools for future emergency use.

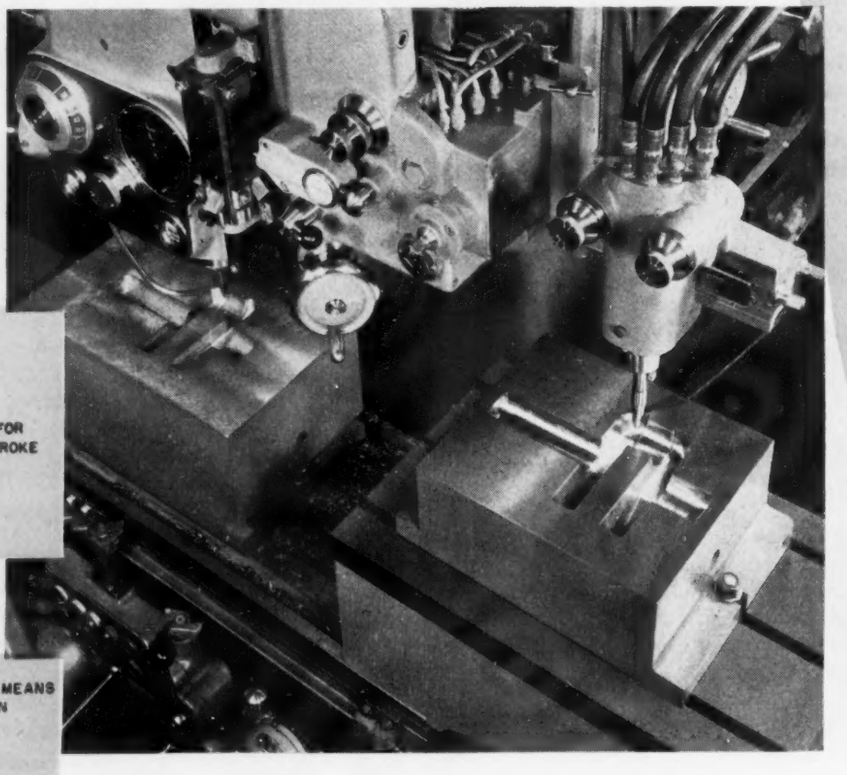
Current estimates of the cost vary widely. The ANMB estimates range from $300 to $500 which is supposed to cover movement of the tools and placing them in storage. However, it is recalled that a study by the RFC when that agency had charge of machine tool disposal indicated the average cost of storing machine tools to be in the neighborhood of $800.

TRANSFER OF SKILL:

There seems to be growing interest in methods by which machine tools can be made to reproduce intricate shapes through template and other pattern and model control. In part this is due to increasing use of dies. Also, it is due to increasing use of highly accurate mathematical curves on parts used in such devices as prime movers, process control apparatus, instruments, etc. (Steel, Oct 7, '46)

Here are four CINCINNATI Hydro-Tel type Milling Machines, all of them good examples of "transfer of skill"... i.e., the machine supplements the skill of the operator to such an extent that it requires him only to load and unload the work after the machine has been properly set up. Once loaded, the machine goes through the milling cycle automatically with very little attention. Through the "transfer of skill," several important considerations have been accomplished. 1) Much of the uncertainty in intricate milling operations such as these is removed. 2) Production is increased while unit costs are lowered. 3) Losses because of spoilage are reduced. 4) Less concentration is necessary—a factor that greatly reduces operator fatigue. 5) Much closer accuracy can be maintained, and subsequent hand finishing of dies and molds is greatly reduced. ¶ You can profitably use CINCINNATI Hydro-Tel type Milling Machines to supplement the skill of your men who are charged with the job of milling complex Profiles and Contours. Our engineers will be glad to study your work and advise you.

CINCINNATI 16" Vertical Hydro-Tel Die-Sinking Machine is illustrated at the right. The operation consists of sinking a single-throw crankshaft die. Through the use of the Automatic Depth Control Mechanism, the complex contours of the metal master shape are accurately reproduced in the die block. Diagrams below show the automatic feed cycle. This machine may also be used for general purpose milling. Write for catalog M-1497.



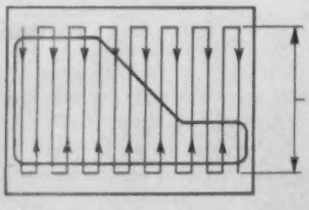
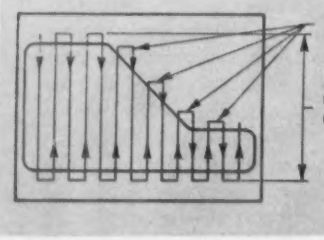


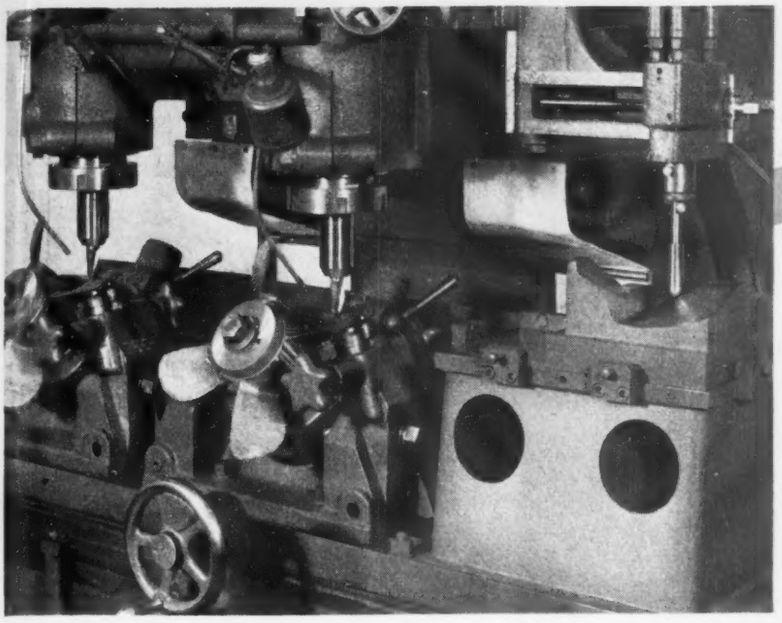
Diagram of Automatic Feed Cycle. It automatically advances the table a selected increment of feed at each reversal of the cross-slide, relieving the operator of this duty.



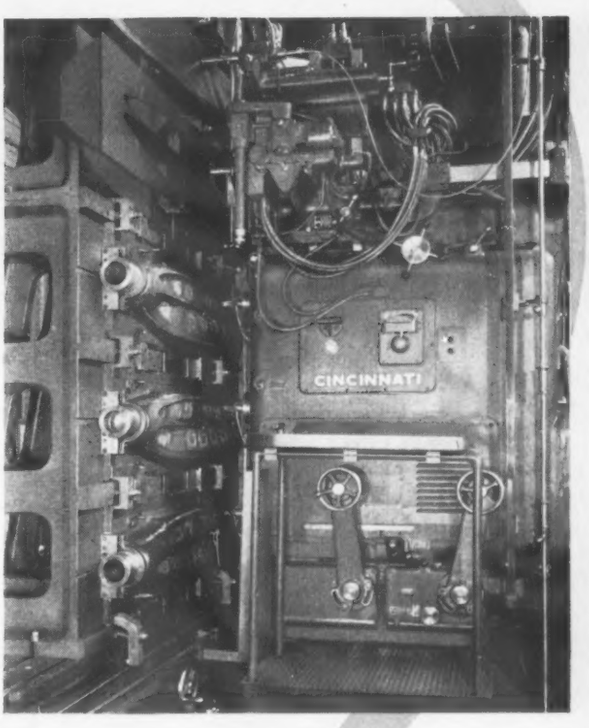
This diagram illustrates how the short stroke feature saves time. When the button is pushed, it stops cross-slide movement, pick feeds the table, and starts cross-slide movement in opposite direction.

THE CINCINNATI

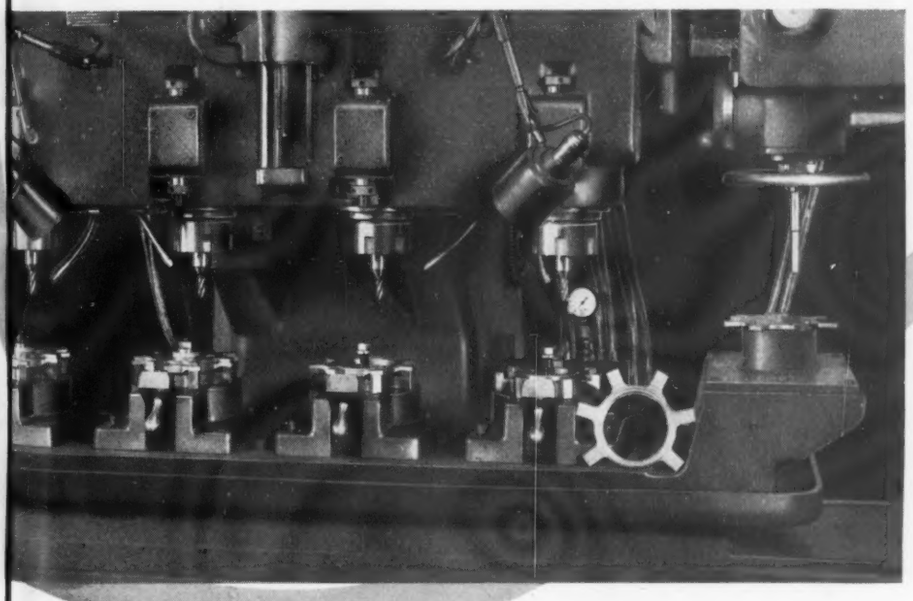
MILLING MACHINES



Above: CINCINNATI 28" Vertical Hydro-Tel Milling Machine, with Automatic Depth Control Unit (Die-Sinking Equipment), and Two Spindle Vertical Head. Here the machine is used not for die-sinking, but for a production job of milling the surfaces of propeller blades. More information on machines of this type may be obtained by writing for catalog M-1284.



Below: As its name implies, the Four Spindle 360° Automatic Profiling Machine has four spindles, constituting four work stations, any one or all of which may be tooled up for profile milling cuts under the guidance of the master control unit at the right. In this illustration, the complex outline of aircraft engine knuckle pin locking plates is completely profile milled—automatically—four at a time—within limits of ± .003". Complete data on these machines is contained in catalog M-1215.



Above: Three aircraft propeller blades are milled at the same time on this CINCINNATI 36" Horizontal Hydro-Tel Milling Machine equipped with 360° Profiling Mechanism and Automatic Depth Control Unit. The skill required to produce the profile of the parts and the complex contour of the blade surface is completely taken over by the machine. Description and engineering specifications of the 36" Horizontal Hydro-Tel may be obtained by writing for catalog M-1285-1.

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Navy Uses

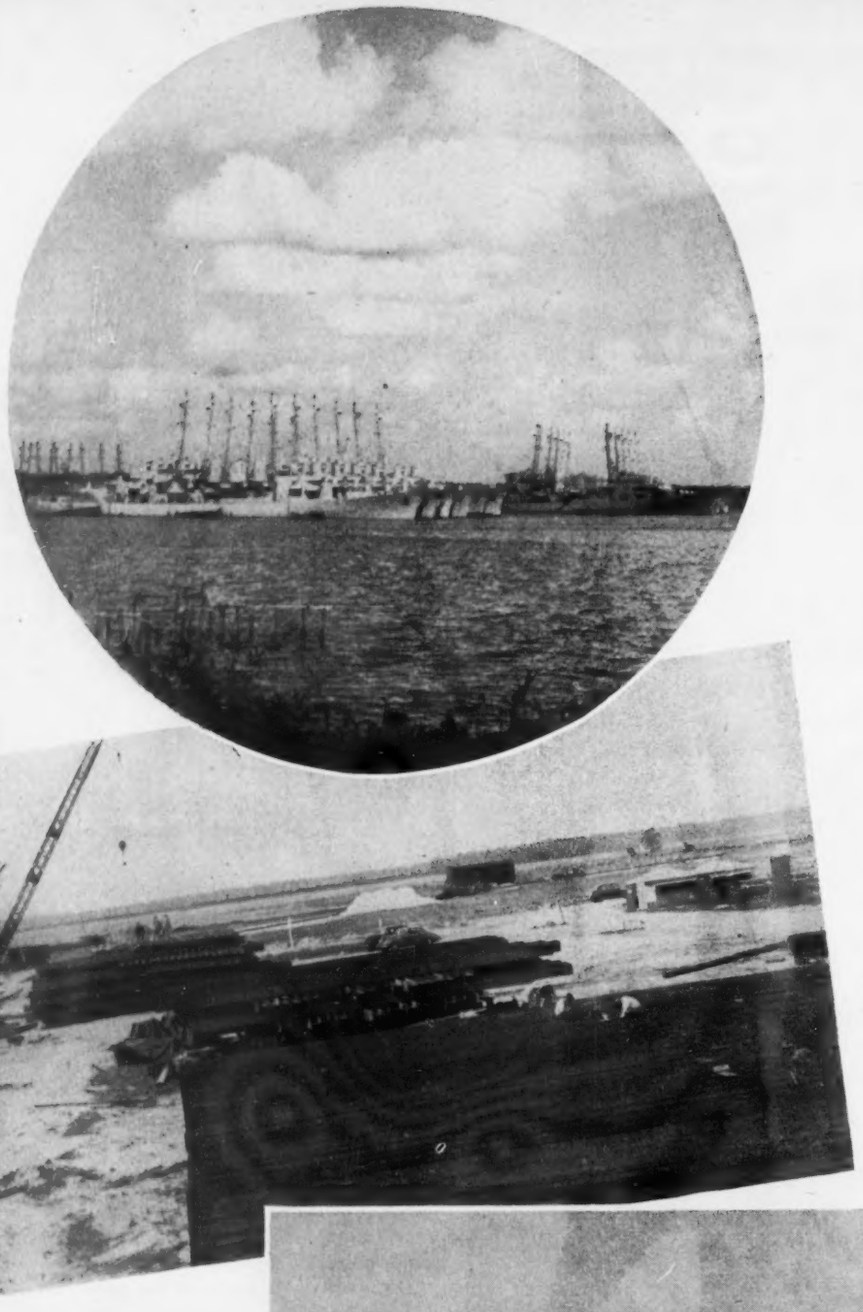
In Preserving

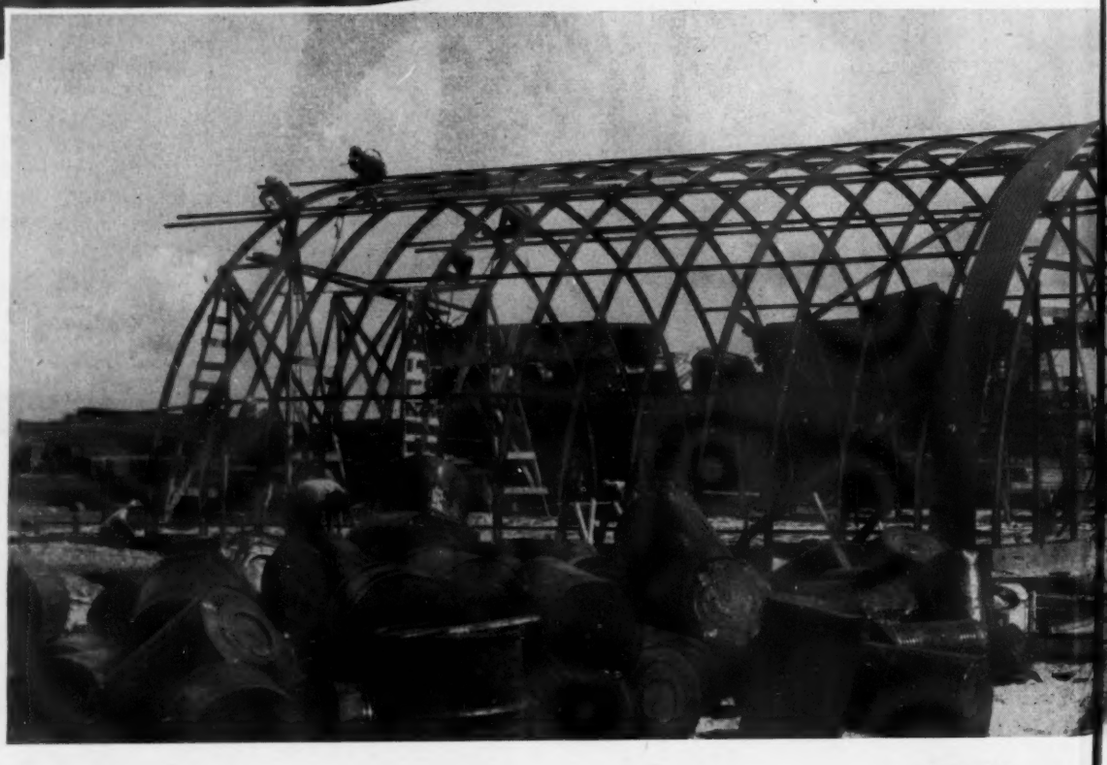
By B. K. PRICE
Eastern Editor, STEEL

SURPLUS government steel is proving highly important in the construction of piers and bulkheads now nearing completion at Green Cove Springs, Fla., where the Navy's largest fresh water berthing area for inactive ships is being laid out along the St. Johns river 40 miles from the sea.

Four thousand tons of H-piling alone are coming from government excess (with a considerable portion from Army surplus) to say nothing of sizable quantities of sheet piling, reinforcing steel, plates, nails and other miscellaneous items. Sheet piling for the bulkheading came in LSTs from the West Coast, where it had been earmarked for shipment to the South Pacific before the close of the war. Cut in half to lengths of 27½ ft it now lines the shore for well more than a mile.

This surplus is valuable not only





Ships anchored in the St. Johns river, top, 40 miles from the sea, await laying up at Green Cove Springs, Fla., berthing dock for future emergencies

Plates are welded on 168 x 80 in. steel piling to be used on permanent pier construction above. Right background shows field offices of Merritt-Chapman & Scott Corp., New York

Lower right, Quonset huts, one of which is shown under construction, are playing important parts in meeting the housing problem

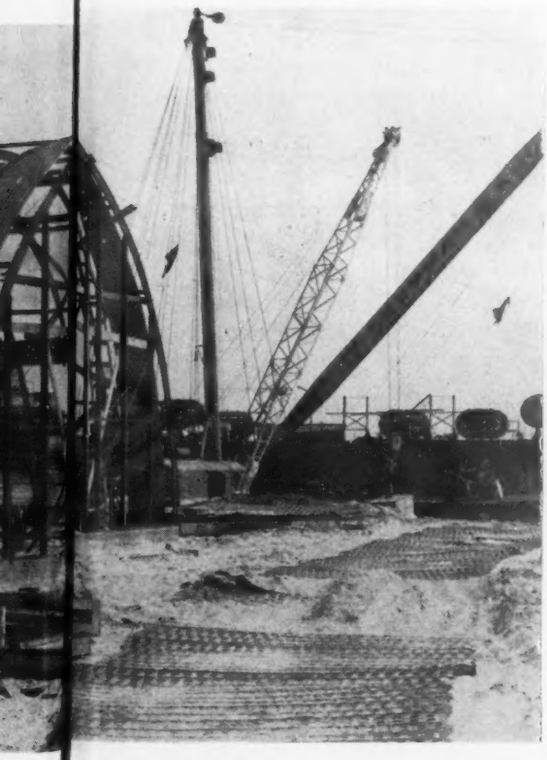
Surplus Steel

Inactive Naval Ships

because of the stringency in steel, for, in fact, without it work upon occasion would have been interrupted, but also because of the saving in premiums for steel which could not be obtained from the mills for deliveries desired—if the steel could be obtained anywhere. Nails, for instance, have been running as high as $40 a keg in the open market, more truthfully in the black market; but the Navy was able to meet its requirements largely from surplus—four thousand 100-lb kegs.

However, producers have been able to supply the major requirements with the Carnegie-Illinois Steel Corp. and the Bethlehem Steel Co. supplying 8000 tons of H-piling and 2000 tons of reinforcing steel (out of 3000 tons required). Thus, with this steel and the government surplus, the Navy has been able to keep within its budget of $10 million for the piers, bulkheads and dredging. Interestingly, of this amount, $6 million is earmarked for materials, with $1,500,000 for government surplus—principally steel.

Development of this project naturally has generated much activity around Green Cove, which a little more than a year ago was a sleepy air training station, with the war over and its original purpose served. As one officer put it, "it was about to be buttoned up and put in camphor." Then came word that Washington had decided to transform it into a berthing area, where hundreds of small and medium draft fighting ships themselves were to be "buttoned up and put in camphor"—for a long indefinite period if all went well, but ready for an emergency on short notice. This meant much work and greatly stepped up the tempo around the station.



Since then, 7,000,000 yards of dredging have been taken from the bottom of the St. Johns river and converted into 75 additional acres of waterfront. Bulkheads have been laid, and long, sturdy piers have been nosed 1845 feet into the stream. By December of last year, under the direction of Capt. C. G. Smallwood, resident officer in charge of construction, and within a year from the time of decision to go ahead, four of these piers had been fully completed, with four more to be ready in February and the remaining three, of a total of eleven, to be finished in March, actually one year after dredging began. Of these piers, ten are to be 30 ft in width and one, a service pier, 50 ft.

Capacity for 554 Ships Planned

Tied up now at the four piers are more than 150 ships, mostly four abreast, and with the first actually tied up on Nov. 14. Once full berthing capacity is available, there will be 554 ships, with an estimated value, based on original cost, of $1,100,000,000. These ships, if laid bow to stern, would cover 30 miles.

Methods for preserving these ships—a portion of nearly 2000 vessels of all types to be laid up by the Navy in this manner at various berthing areas—involve the use of chemical dehumidifying agents, rust inhibitors and metal and plastic coverings. These methods were extensively described in STEEL, April 29, 1946, p. 90.

In addition to $10 million for piers, dredging and bulkheading, $3 million will be spent for housing and station facilities, with housing the largest item. Included in the housing development now going forward are a number of Quonset huts, 20 by 48 ft, each divided into two living apartments. Eventually there will be maintenance and repair shops and further warehousing facilities.

Each of the ten berthing piers will require 412 H-piles, 176 being bearing piles and 236 batter piles. In addition, each of these particular piers will use 245 tons of reinforcing steel. The 50-ft service pier will require 446 bearing piles and 424 batter piles, making in all a total of about 5000 H-piles for the piers. These piles are 14 inches by 75 to 80 ft. Four hundred tons of reinforcing steel will be required for the service pier.

Piling surfaces exposed to water and other corrosive elements are given a special pipe enamel coating, but first the piling is flame cleaned and scraped with wire brushes and then given a tar base prime coating. Considerable care is taken in applying the enamel coating. This coating is applied to a thickness of 1/16-in., with a 1/32-in. tolerance; put on too thickly it will peel, it is said.

Carloadings Expected To Show 32 Per Cent Increase

Estimates of carloadings for the first quarter of 1947 in the Great Lakes Regional Advisory Board territory show an increase over the corresponding quarter of 1946 of 32 per cent, the board has announced. Current quarter's forecast carloadings for all listed commodities is 370,440 compared to 279,893 for 1946's first quarter.

Of 27 advisory board classifications of commodities for which last year's actual and this year's estimated carloadings have been determined, none shows decreases from last year's first quarter shipments. Only three commodities—fresh fruits other than citrus fruits, potatoes, and other fresh vegetables—are expected to show no change in carloadings. The remainder will increase in carloadings, according to the prediction.

Showing the greatest percentage of increase will be automobiles and trucks, with forecast carloadings of 54,040 for the quarter, an increase of 194 per cent over 1946's first quarter loadings of 18,381. Vehicle parts are expected to show the second largest increase with 55,229, or 107 per cent more than the 1946 figure of 26,723. Iron and steel are expected to increase 31 per cent to 50,717 from 1946's figure of 38,715. The increase in carloadings of machinery and boilers is forecast at 28 per cent to 8361 from 6512 in 1946's first quarter.

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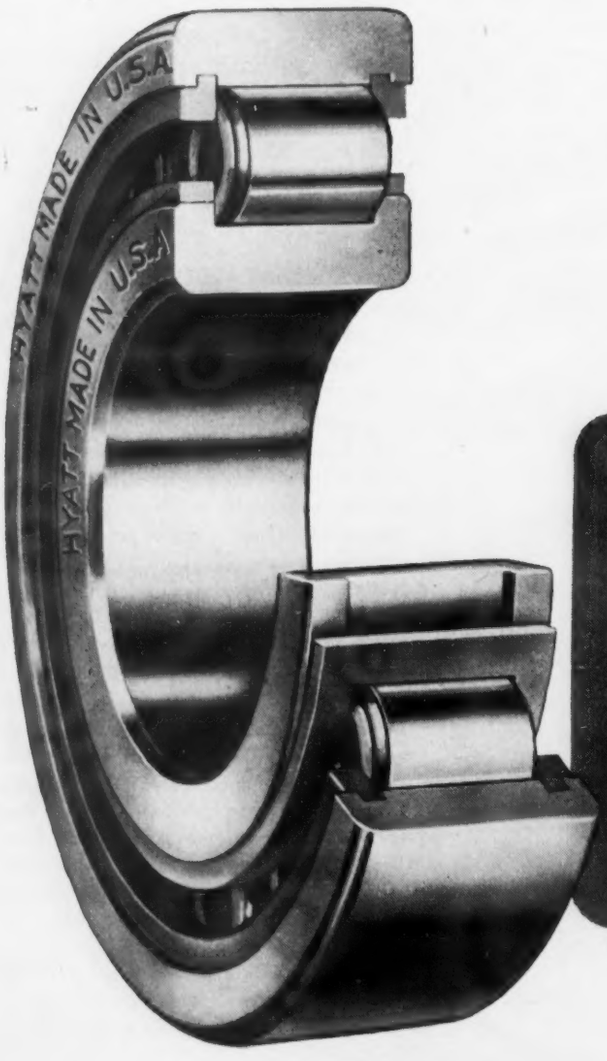

HYATT
ROLLER BEARINGS

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

"Cash troubles" bother many industries as result of heavy drain on profits by corporate taxes. Expenditures for inventories of plant expansions studied carefully. Many contemplated expenditures canceled

DETROIT

LAST summer and early fall, almost coincident with the hefty collapse of values on the New York Stock Exchange, many industries throughout the country, both large and small, were experiencing "cash troubles." Many were operating in red ink, had large sums of money earmarked for expansion programs and new tooling. Top executives with an appreciation of corporation accounting were becoming fearful of heavy drains on working capital. They realized that a company might be operating at a loss, but if its cash position was strong there was not too much to worry about, and conversely a company might be operating at a profit with a deteriorated cash position, which would call for caution.

To build up cash balances, many companies resorted to new financing or negotiated revolving credits from banks. It was about at this time that new financing took a cold plunge. Some programs barely got under the wire, others cost the underwriters substantial amounts of money, still others were called off until a more propitious date.

Even General Motors Corp., with its multimillion reserves, found it necessary to reinforce working capital by borrowing $125 million from banks and floating $100 million in a new preferred stock issue. Shortly thereafter GM called off an appreciable portion of its 1948 model tooling and sold dies for scrap, apparently preferring to take the large loss involved instead of further extending its cash outlay for new model development.

The 1946 corporate financial picture is pretty well muddied up by tax carrybacks, renegotiations of war contracts still hanging fire and other settlements which had to be finalized. Tax carrybacks proved to be a welcome cushion for most companies as far as their overall profit performance for the year was concerned, and a high level of operations in the fourth quarter further bolstered the record. What deeply concerns many executives now—and this is not peculiar to the automotive industry—is the possibility of another "cash emergency" developing later this year. Their fears spring mainly from the terrific bite which federal taxes take out of any profits that may be earned. This tax is now 38 per cent and must be paid in cash every three months. Thus, if a company should show a book profit of $200,000 in the first three months of 1947, then on April 1 it must hand over to the revenue department cash to the extent of $76,000. Expenditures for inventories or modest plant expansions have to be given extra-careful consideration before authorization in view of these cash drains for taxes which come up quarterly. Plans for introduction of new products, new models, new equipment in many cases are put on the shelf or deferred indefinitely.

This is not a healthy situation, but until some relief is granted in the form of corporate tax modifications by Congress, manufacturers will just have to keep marking time and take the necessary steps to preserve a sound cash position. Feeling over this problem runs high and the heavy burden of 1947 taxes has not been given the recognition due it.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

Estimates by Ward's Automotive Reports

	1946	1941
January	121,934	524,073
February	84,141	509,332
March	140,777	533,878
April	248,318	489,856
May	247,620	545,355
June	216,637	546,278
July	331,000	468,897
August	359,101	164,793
September	342,727	248,751
October	410,466	401,369
November	380,460	373,892
December	380,908°	302,518
Total, 12 ms.	3,264,089°	5,108,992

Estimates for week ended:

	1947	1946
Jan. 18	75,166	28,485
Jan. 25	93,278	29,410
Feb. 1	95,295	29,295
Feb. 8	100,000	23,785

° *Preliminary.*

Tooling Costs Up Sharply

On top of the tax load, manufacturers contemplating new products or models are faced with high cost for tools, dies, jigs and fixtures. Combination of high hourly wage rates for skilled labor and the leisurely pace at which most of these artisans work currently tell the story.

Automotive tooling has never been cheap, the only justification for the cost being the relatively low amortization cost when spread over production running into the hundreds of thousands or millions. For example, one day in the fall of 1941, a group of Fisher Body executives stood near the "body-drop" at one of the GM Division plants to watch the first body of the 1942 line lower onto a waiting chassis. As it passed their view, one official remarked: "Well, there goes a $15 million body." What he meant was that this first body was symbolic of the first bodies coming down on new models in all other GM Divisions at about that time, for which the special tools and dies, including experimental and designing costs, would add up to around $15 million expenditure for Fisher Body exclusive, of course, of the $52 million the division had invested in plants and property and $62 million in machine tools and other long-term equipment.

Similar Problems Still Exist

In the entire Fisher Body program for that year were 82 different models, each requiring designing, engineering, cost-estimating, tooling, fabricating and assembling for an average of 850 items and 2400 distinct parts. The same thing holds true today, so it is not difficult to appreciate the impact of the increase in tooling costs considering that the 1941 figure was $15 million.

Since the major part of tooling costs is labor, the likelihood of any important early reduction in conventional types of tooling is remote. Alternatives are to call off new programs, consolidate on fewer new models to reduce the amount of tooling, or to discover less costly techniques. The latter course is being pursued to a degree and may have interesting possibilities, as yet not fully determined. Specifically, it has been found possible to produce steel stampings in fairly large lots on zinc-alloy dies of the Kirksite type. These dies are readily cast to accurate shape from precision wood patterns and require little or no machining and grinding before use. After completion of a run, the dies can be remelted and the metal used again, with only a slight loss.

Overseas operations of General Motors are concentrating on this type of

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tooling and foundries for casting the zinc alloy are being built in ten or more scattered localities throughout the world in GM plant areas. Economic advantage of the material is considerable when production runs are limited, as is the case in overseas production. Number of stampings obtainable on a set of Kirksite dies is dependent upon a number of factors, including the design of the stampings, depth of draw, gage of steel, etc. Actually there are few data available to indicate just what the upper limit is, cases being reported of as many as 50,000 pieces being run, with no observable deterioration on the dies.

This type of tooling is not recommended, of course, for production runs of the type encountered in plants of large-volume manufacturers where cast iron and steel dies can be amortized comfortably. On the other hand, there may be many cases where savings could be realized with zinc alloy dies by virtue of the fact annual production is not sufficient to justify current cost of "hard" dies. One company is making good use of this type of tooling for production of service parts on models where the original dies have been discarded during the war years.

Editorial Policy Modified

A noticeable moderation has been effected in the editorial policy of *Ford Facts,* weekly newspaper published by UAW-CIO Local 600 at the Ford Rouge Plant. A few months ago, poison-pen artists of the sheet were heaping abuse on the Ford management, even to the point of slander and villification. A new editor now has taken over and currently "news" articles are much more temperate in tone—possibly in line with the nation-wide union technique of walking softly and speaking in whispers while the Congress is considering new legislation aimed at correcting the excesses of union activities.

The Ford union, of course, can still find plenty to kick about. Thus, in recent comment on the Ford price cut, the union writers speculated that the move may have been a "desperate bid for customers." Alluding to the fact Chevrolet outdistanced Ford in 1946 production, the article continued: "Much modernization will be needed at Ford, insiders report, before it is in a sound competitive position. Body design and many other departments are far behind GM, it is reported. Two reasons for Ford backwardness are said to be that many of its people in the planning and design departments are Ford Trade School graduates, not always the most promising material, and secondly that employees in those departments are speeded up so steadily that they have no time for originality or initiative."

Observe the careful phrasing to make the statement appear to be the opinion of outsiders, and also the ingenious injection of the "speed-up" argument, the union's only answer to company efforts to improve productivity. Elsewhere in the union paper, in reports from motor building and pressed steel departments, written by union reporters, are instances of specific changes made in machinery and equipment in the interests of cost reduction. The examples cited suffer from lack of intelligible cost data, just enough figures being presented to convince the average union member that large savings are being made which should be passed on to him in the form of higher wages and lower prices. Unfortunately, the real facts of these savings are not made known to plant employees by the company.

EXPERIMENTAL WORK

Experimental work is proceeding among half a dozen suppliers of brake lining material and certain rubber companies aimed at perfecting a cement for bonding lining composition to brake shoes, eliminating rivets altogether. Principal difficulty is in discovering a suitable cement which will withstand the higher temperatures involved in severe brake duty. Synthetic resins may provide the answer. Chrysler's cycleweld system of adhesive bonding has been tried in this application and with modifications may prove acceptable.

By effecting a 100 per cent bond between lining and shoe, better heat dissipation is possible, improving brake efficiency. Further, the elimination of rivets, it is said, would permit effective use of a greater thickness of lining and eliminate scoring of brake drums. Removal of worn lining for replacement would involve dissolving the old lining by a strong reagent, or, perhaps more economically, replacing the entire brake shoe.

Truck Line To Start

First truck will pop off the new $2,100,000 assembly line at the Ford Highland Park Plant this week. Truck assembly has been moved to this location from the Rouge Plant, and the new line is 1410 ft long, as against 800 ft at the Rouge, with capacity of 400 units daily. Some 43 different truck models are produced, and the intricate system of co-ordinating the assembly line so that bodies and chassis integrate at the proper time and place is controlled from a central telautograph booth in constant communication with a dozen other automatic writers along the line.

1947 Chevrolet Changes

Distinguishing features of the 1947 Chevrolet models include a new radiator grille, new nameplates and removal of horizontal belt molding strips to accentuate a more massive appearance. In the engine a new type of water pump seal, of asbestos and bakelite composition, is used to improve wear and leak resistance. In the chassis, a softer and more resilient live-rubber transmission support is used and shear-type rubber side supports are designed to absorb more torque reaction from the engine. A prelubricated powder-metal clutch pilot bearing replaces the former roller bearing. Hydraulic brake lines incorporate a dryseal pipe thread design to eliminate sealer compounds.

Larger Studebaker Offered

Studebaker now has in production a new and larger luxury model known as the land cruiser, a four-door sedan with 4 in. longer wheelbase. Deluxe interior appointments are featured. Mechanically the model is identical with the commander series.

Withholds Tax Payment

Unusual aspect of the Willys-Overland financial statement is the section describing how the company has elected to withhold payment of excess profits taxes for the three years ended Sept. 30, 1944, in the amount of $6,235,603, although this sum is included in the balance sheet as a current liability. No provision is made for interest which would amount to $1,160,000 computed to include Sept. 30, 1946.

A Treasury Department agent has proposed a net deficiency of $8,788,572, exclusive of interest for the three years ended Sept. 30, 1943, but the Willys management is vigorously contesting all the agent's findings, including his rejection of the company's relief claims for the fiscal years 1942 and 1943.

Ultimate decision will be awaited with interest by many other industrial companies. Willys-Overland feels it has made ample provisions in current liabilities and in reserves of contingencies to cover any probable ultimate assessments and interest for the years in dispute. No taxes were withheld for the fiscal year, 1945.

Cold-Headed Specialties

HASSALL cold-heading may solve your immediate special part problem . . . Special nails, rivets, and threaded parts made in diameters from 1/32" to 3/8" —lengths up to 6" . . . Rivets 3/32" diameter and smaller a specialty . . . Variety of metals, finishes and secondary operations . . . Economy, quality and quick delivery in large or small quantities . . . Tell us what you need . . . We will answer promptly. ASK FOR FREE CATALOG. 3-color Decimal Equivalents Wall Chart free on request.

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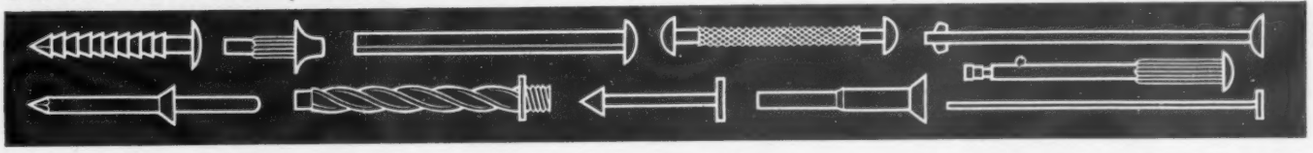

MANUFACTURERS OF COLD-FORGED SPECIALTIES—ESTABLISHED 1850

Defiance Making Line of Plastic Pre-Form Presses

Machine tool company producing compacting machinery as well as established line of heavy equipment

DEFIANCE Machine Works, Defiance, O., which has been operating in the machine tool field since 1850, has become actively engaged in producing machinery for the plastics and allied industries, Don Champlin, general manager, recently announced. Currently the company is manufacturing two models of plastic pre-form presses, more than 200 of which have already been sold to industry.

The company's established production of heavy equipment for the machine tool industry continues to account for at least half of its total output, Mr. Champlin stated.

In reviewing the company's progress in almost 100 years of operation, Mr. Champlin said that it had furnished machines for every conceivable task from making artillery spokes for use during the Civil War to producing machines which in turn produced machines which helped manufacture the atomic bomb.

New work on which Defiance's industrial research laboratory is engaged, according to Mr. Champlin, includes several projects in which the nature of the material to be compacted has not been revealed even to laboratory technicians. The experimentation in compacting, however, may have interesting applications in the plastics, pharmaceutical, ceramic, chemical and food industries, he added.

AWARDED FRITZ MEDAL: Dr. L. W. Chubb, left, director of the Westinghouse Research Laboratories, East Pittsburgh, Pa., receives the John Fritz Medal at the winter meeting of the American Institute of Electrical Engineers in New York, from N. E. Funk, chairman of the board of awards. NEA photo

Ground To Be Broken for Erie's Concentrating Plant

Erie Mining Co., Cleveland, is expected to begin work this month on a $2 million ore concentrating plant on the Mesabi range in St. Louis county, Minn. Early 1948 has been tentatively set as the date for completion of the project. The plant will be engineered by Pickands, Mather & Co., Cleveland, which has a large interest in the Erie company.

All plans for the facility have been drawn, and equipment ordered. The entire project is on an experimental basis, and a larger, more commercially practical plant will be built later with changes based on experience gained from the experimental plant. Although smaller than a normal commercial project, this experimental facility will use full-sized equipment.

This action by the Erie and Pickands, Mather companies coincides with similar steps taken recently by United States Steel Corp. to provide against the future when the high grade ore reserves in Minnesota are exhausted. Present plans call for treatment of taconite ore which contains 25-32 per cent iron.

Executive Envisions Larger Oxygen Generating Plants

Improved methods of generating oxygen will be among the most important future developments in industry, according to a report by Earl P. Stevenson, president, Arthur D. Little Inc., Cambridge, Mass. At the company's annual meeting, Mr. Stevenson reported that it is now possible to build small producing plants in oxygen-consuming factories and thus eliminate the expense of oxygen transport.

Developments in the manufacture of oxygen make possible construction of large oxygen plants which will make use of the gas practical in industries which have not previously considered it feasible. One such large plant, Mr. Stevenson said, will produce oxygen for use in making synthetic gasoline; its planned capacity is almost as great as that of all other oxygen-producing plants in the country. Other potential applications are in steel production and in the manufacture of fuel gas.

Bethlehem Pacific Plans Alameda Works Expansion

Reflecting prospects for increasing industrial construction activity in California, plans are being made by Bethlehem Pacific Coast Steel Corp. for expansion of its Alameda fabricating works in the San Francisco Bay area. The Bethlehem plant at Alameda has the largest capacity in this region for fabrication of heavy structural steel for bridges and buildings.

Irwin F. Kurtz, Alameda works manager, said the plant expansion would be undertaken "as soon as conditions warrant." No details are released as to scope of the increase planned or as to expense the project will entail.

Mr. Kurtz reported the Alameda works now has on hand a backlog of orders sufficient for six months' capacity operations. Rated capacity is 26,400 tons annually, but because of a shortage of skilled draftsmen, production currently is running at an annual rate of about 20,000 tons.

BRIEFS . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Granite Foundries Corp., Rockford, Ill., has purchased from WAA for $80,705.26 the government-owned foundry which it operated during the war and since the end of the war on an interim lease. Original cost to the government was $185,000.

—o—

Industrial Timer Corp., Newark, N. J., announces a new sales policy whereby it will sell its line of industrial timing equipment direct to retailers and end-product manufacturers. Sales offices are established in New York, Philadelphia, Boston, Cleveland, Detroit, Chicago, St. Louis, Kansas City, Mo., Pittsburgh, Buffalo and Atlanta.

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Monsanto Chemical Co., St. Louis, has formed a Texas division of the company with headquarters at Texas City and has named Joseph R. Mares general manager. A 50,000 ton capacity styrene plant at Texas City will form a nucleus for the manufacturing division.

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General Electric Co., Schenectady, N. Y., has completed a 120,000 sq ft plant at Mattoon, Ill., for the production of electric lamps. Contractor was H. K. Ferguson Co., New York.

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Island Equipment Corp., New York, manufacturer of conveying equipment, has opened a branch office at 2631 Woodward Ave., Detroit.

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Lester B. Knight & Associates Inc., Chicago, consulting engineer, has moved its office from 120 S. LaSalle St. to 600 W. Jackson Blvd.

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Massey-Harris Co., Racine, Wis., has a new line of tractors which includes five models ranging in price from $1121 to $2410. The firm plans to go into production next June in Canada on a small tractor which will be sold both in Canada and in the U. S.

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Revolvator Co., North Bergen, N. J., manufacturer of materials handling equipment, has completed construction of an office buliding.

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Smaller Manufacturers Council, Pittsburgh, has published a classified commodity directory covering products manufactured by approximately 200 member companies.

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White Motor Co., Cleveland, manufacturer of trucks and busses, has a $10 million expansion program under way which includes recent purchase of plant on E. 185th St. from WAA and additions to the old plant at E. 79th St.

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Sheffield Corp., Dayton, has formed an Australian subsidiary, Sheffield Corp. of Australia Pty. Ltd., for the manufacture and sale of gages, measuring instruments and machine tools. Louis Polk, an Australian, heads the venture.

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Electric Products Co., Cleveland, has appointed Udylite Corp., Detroit, as a national distributor of its electrolytic motor generators.

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Moore Corp., Joliet, Ill., has begun production of its smokeless coal heater, designed to meet rigorous smoke prevention ordinances now in effect in many cities.

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Chesapeake & Ohio Railway, Cleveland, will be host when 300 members of Virginia Boys' Clubs board a train at Newport News, Va., Feb. 18 for a four-day, nominal fare, educational tour to Detroit. Postponed from Dec. 3 because of the coal strike, the tour is the second under a plan to provide educational travel opportunities at token expenses to boys' clubs in all cities along the C. & O. line.

—o—

Production Engineering Co., Berkeley, Calif., has purchased a government-owned marine engine plant in Berkeley, Calif., for $88,500. With the exception of four cranes, the plant includes no equipment and contains 28,687 sq ft of floor space. The purchaser will make industrial and contractors' machinery.

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DoALL Co., Minneapolis, distributor of machine tools, has moved its sales office to Des Plaines, Ill. There will be no change in key personnel.

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Hotpoint Inc., Chicago, has completed a series of distributor meetings on its refrigeration products which include four cubic foot and eight cubic foot home freezers.

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United States Rubber Co., New York, has acquired an interest in North British Rubber Co. Ltd., Edinburgh. Terms of the agreement provide that the British firm will manufacture goods for U. S. Rubber's British subsidiary, Dominion Rubber Co. Ltd., for resale in Great Britain and for export from Great Britain.

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National Safety Council, Chicago, has published its *Accident Prevention Manual for Industrial Operations,* after two and a half years of research preparation.

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Chicago Bridge & Iron Co., Chicago, has closed its branch office in Washington. The business formerly conducted there will be handled through the Philadelphia branch at 1700 Walnut St.

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Southern Aircraft Corp., Garland, Tex., has converted to production of school bus bodies made almost entirely of aluminum alloy. Schedules call for an output of 300 a month by May.

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American By-Product Coke Institute, Washington, announces its name has been changed to American Coke & Coal Chemical Institute.

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Canedy-Otto Co., Chicago Heights, Ill., has appointed American Steel Export Co., New York, export agent for its line of drilling equipment.

—o—

Appliance and Merchandise Department, Lowell, Mass., General Electric Co., has purchased a 437,000 sq ft factory in Lowell from War Assets Administration. Formerly occupied by U. S. Rubber Co., the plant will be used to manufacture building wire and other electrical construction materials.

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H. W. North Co., Erie, Pa., designer of equipment for process industries, has appointed Bullock-Smith Associates as engineering representatives and eastern sales agents with headquarters in New York.

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Reading Chain & Block Corp., Reading, Pa., maker of materials handling equipment, has appointed the following district representatives: H & H Foundry Supply, Detroit; Ellis Scott Co., Indianapolis; Hall Equipment & Engineering Co., Cincinnati; Russel C. Hedeen Co., San Francisco.

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California Air Products Co., Huntington Park, Calif., will soon begin production of welding and cutting equipment at its new plant in Huntington Park. The firm is a subsidiary of Burdett Oxygen Co., Cleveland.

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All-State Welding Alloys Co. Inc., White Plains, N. Y., maker of welding and brazing alloys, has opened an export office in New York under direction of J. V. Cremonin.

Pacific Coast Ranks High as Metalworking and Foundry Center

Area stands third in number of plants and fourth in number of workers in iron and steel foundry industry. Similar relative standing reported in fabricating. Unionization high in some lines but showing for machine shops is below national average

LOS ANGELES

IN A SPECIAL report just made public, Eltinge T. Brown, manager, Metal Trades Manufacturers Association of Southern California, outlines the status of developments in that general field in West Coast areas, as related to wages, numbers employed and scope of operation.

The report covers ferrous and nonferrous foundries, fabricated structurals, iron and steel forgings, machinery, machine tools and accessories production, tool and die jobbers, electroplating and polishing, sheet metal and power boilers.

Quoting U. S. Bureau of Labor Statistics, tabulations disclose that the West Coast stands third in the nation as to number of plants and fourth in the number of workers employed in steel and iron foundries.

Forty-nine plants are in the Los Angeles area; the total number on the coast is 120; thus 40.8 per cent are located within the Los Angeles geographical region.

While unionization is higher than anywhere else in the ferrous foundry industry, Los Angeles itself is only 46.2 per cent unionized. San Francisco, Seattle and Portland are each 100 per cent. In all, the Pacific states are 83.3 unionized as against the next highest area, the Great Lakes states, which are 77.3 per cent. Average unionization for the nation is 62.5 per cent.

As to wages, 64.1 per cent of the coast's ferrous foundry workers receive from $1 to $1.999 per hour, while 35.3 per cent receive less than $1 an hour. Total average wage rate for the coast is $1.09; for the next highest area, the Great Lakes, the average rate is $1.04 an hour.

NUMBER OF WORKERS in the ferrous foundry field in Pacific states stands at 13,200; in the United States, 235,650; in Los Angeles alone, 4637.

In nonferrous foundries, coast figures follow closely those of the ferrous industry, the Pacific area being third in the nation in number of plants and fourth in number of workers employed. The relation of Los Angeles to the foundry industry as a whole is, however, different. There are 51 nonferrous works there, or 63.7 per cent of the total for the Pacific states. Moreover, 82 per cent of the total number of nonferrous workers are employed in the Los Angeles area. Some 65.8 per cent of nonferrous plants on the coast are unionized while only 31.3 per cent are organized in Los Angeles. Average hourly wage paid in that city is $1.11; for the Pacific Coast as a whole, $1.12; for the United States, $1.03.

Third in the number of plants and fourth in the number of workers, the Pacific states hold a similar relative position in fabricated structurals as in total foundry operations. Of the 68 structural plants on the coast, 28, or 41.2 per cent, are in Los Angeles.

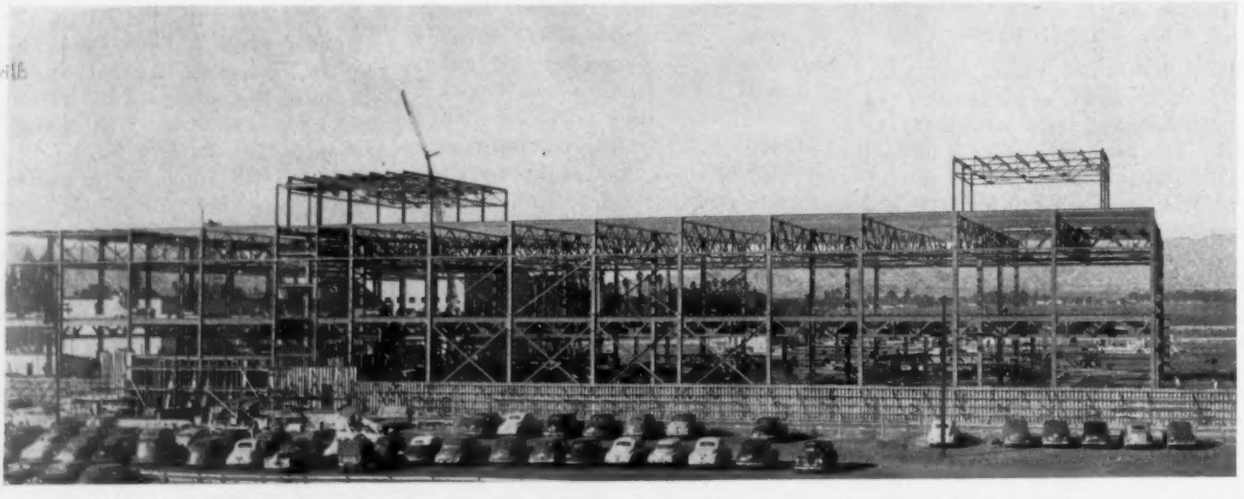
About 85 per cent of the coast's fabricated structural steel plants are unionized. Among Los Angeles plants, 65 per cent are organized. Average hourly earnings on the coast are 22.7 per cent higher than the average for the country as a whole. In Los Angeles the average wage is $1.18; in all coast states, $1.19; in the nation $0.97.

Again, the Pacific area ranks third in number of iron and steel forging plants, and fourth in the number of workers as compared with other recognized industrial regions located in the United States.

While all coast states' areas are 50 per cent union and 50 per cent nonunion, the Los Angeles area is only 25 per cent union and 75 per cent unorganized. It is noted that the Great Lakes states show greatest organization in forge plants, with 67.6 unionized. The national average is 57.1 per cent unionized in plants of this type.

THE METAL TRADES association report indicates that in production of electrical machinery, machine tools and machine tool accessories, the Pacific states are third and fourth, respectively, in number of plants and number of workers.

"Reports have been rampant on the



WESTERN CHEVROLET PLANT: Construction of a new Chevrolet assembly plant at Van Nuys, Calif., is progressing rapidly, with structural steel being erected at a rate of 100 tons a day. Fabrication and erection is being performed by Bethlehem Pacific Coast Steel Corp., Los Angeles. Plant will cover 11 acres

Pacific Coast that unionization in the field of machine shops is exceedingly high," the association report states, "but fact findings disprove this."

While the average for the entire nation is 37.8 per cent union and 62.2 per cent nonunion, Los Angeles machine shops are 72.6 per cent nonunion, with 69.5 per cent of all Pacific plants in that area, the report shows. Number of workers employed in all coast states is 62,000; in Los Angeles, 21,115.

As to machine accessories industries, the association figures, mirroring those of the BLS, show only five plants and 300 workers for this field in the Pacific region. These five plants are 100 per cent union; over-all average hourly earnings are $1.46, highest in the nation, with 98.5 per cent of Coast workers receiving $1 or more an hour.

Fourth in number and fourth in worker count are Pacific States tool and die shops. In this category, 86.2 are nonunion in the entire region, while Los Angeles is 90.5 per cent nonunion. In that city are 89.4 per cent of all Pacific Coast area factories which produce tools and dies.

In electroplating and polishing the Pacific States again rank four and four in numbers of plants and of workers. Unionization there is 34.6 per cent; in the United States, it is 26.2; in Los Angeles alone it is 81 per cent unorganized.

In all coast states the worker total is 1215; in Los Angeles only, there are 1210 (all except 5) of the plater and polisher workers.

LOS ANGELES HAS 48.4 per cent of all sheet metal plants on the coast, the total being 130 plants, with 63 in Los Angeles. Workers total 5050 in all the coast region with 3000 in Los Angeles. Some 76.6 per cent of shops are union in that city, while the national average is 56.1 per cent union.

In number of plants and number of workers employed in the power boiler industry, the Pacific coast states are exceeded only by the Great Lakes and Mid-Atlantic states. Of 69 plants on the coast, 32 are in the Los Angeles area, while 56.8 per cent of all the coast's workers are employed there.

Los Angeles is but 31.3 per cent organized; the entire coast area is 71.1 per cent organized. Average unionization of the industry in the nation is 53.5 per cent.

Number of power boiler workers in the Pacific area is 6100; in Los Angeles are 3462 of these; in the United States, there are 44,439 workers. Over-all average hourly earnings in Los Angeles is $1.17, in the Pacific states, $1.20 and in the United States, $0.98.

British Steel Production Held Down by Restricted Coal Supply

Serious contraction in output threatened by 25 per cent cut in allocation of fuel. Critical transport situation and severe weather add to difficulties. Welsh tin plate exports show declining tendency

WITH TEMPERATURES much below what are usually experienced in an English winter cuts in allocation of fuel are such that an increasing number of firms, including iron and steel works, have found it necessary to shorten the work week.

The 25 per cent cut in allocation of coal to the iron and steel industry threatens serious contraction of output. The position is to be reviewed by the government in six weeks. Meanwhile it is estimated the loss in steel production may amount to 400,000 tons, and already the industry is forecasting that in the altered circumstances the 1947 target of 13½ to 13¾ million tons of steel will be beyond attainment.

Dorman Lang & Co. Ltd. declares that although everything will be done to minimize the effect of the fuel scarcity, it will be impossible to avoid the idling of certain plants. The situation is even more difficult because the critical transport position has caused serious interference with the carriage of ores from the Midlands to Tees side.

The cut in output may not be immediately noticeable to industrial consumers of steel for the reason that owing to the shortage of railroad cars a substantial tonnage of steel is in works awaiting delivery. But when this steel has been distributed customers will then find their contracts falling further into arrears. Industries like shipbuilding and automobile building seem certain to suffer during the next few weeks unless there is an appreciable improvement in the fuel position.

SHEET MILLS CONTINUE full of work with backlogs running into very large tonnages. Delivery of material ordered now may not be received before third quarter. Rerollers are suffering from a shortage of semifinished steel especially soft billets. Quantities obtainable from abroad are a shadow of what would arrive under normal conditions but users are hoping some semifinished will be available from America the latter part of the year.

Iron founders have not had coke allocations restricted, but as makers of pig iron have suffered a cut there will be less of that material available. Pig iron control authorities have shortened the period of licenses from three to two months as this is about as far as possible to see ahead. Meanwhile the demand for light castings grows, and as better weather arrives and house building is resumed on a wider scale makers of light castings will be asked to increase deliveries. There is a shortage of molders though the position is improving slowly. Supplies of iron for the production of heavy engineering castings for which there is a keen industrial demand are coming through in good tonnages.

IN THE WELSH TINPLATE industry domestic consumers are anxious to cover their requirements as far ahead as possible. Makers have satisfactory order books and they will have little difficulty in selling all the Welsh tin plate that the mills can produce, so that they are somewhat reluctant to book too far ahead in case later on they may be allowed to undertake a larger percentage of export business than in recent months. Exports of tin plate from Wales have shown a declining tendency recently owing to the smaller allocations.

Answering questions in the House of Commons recently, C. W. Key, parliamentary secretary to the ministry of health, stated that only 70 of an original target of 30,000 houses had been completed. One of the reasons for this failure was the fact that in addition to the shortage of steel there were insufficient nuts and bolts.

German Porcelain Enameling Industry Report Released

Germany's porcelain enameling industry, although older than that of the United States, was far behind American industry both in volume and speed of production, according to a report by C. J. Harbert, Harshaw Chemical Co., Cleveland, recently released by the Office of Technical Services, Department of Commerce.

The report points out that, in general, plant layouts and manufacturing methods were obsolete and inadequate compared with American standards.

Men of Industry

CHARLES S. HEGEL

JOHN W. QUEEN

ROBERT C. TYSON

Charles S. Hegel has been appointed manager, Stainless Steel Division, and **John W. Queen** manager, Alloy Steel Division, Joseph T. Ryerson & Son Inc., Chicago. **G. Van Dyke,** former head of the Ryerson Special Steels Division, has retired after 30 years with the company.

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Stephen S. Conway has been appointed vice president, sales department, of the Brake Shoe & Castings Division, American Brake Shoe Co., New York. Formerly assistant vice president, sales, he has been with the company since 1912. He will continue to be located in Chicago. **Ralph L. Robinson,** district sales manager of the Brake Shoe & Castings Division, has been appointed assistant vice president in the sales department.

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Robert M. Carpenter has been named general manager, Manufacturing Division, All American Aviation Inc., Wilmington, Del. He succeeds **Charles W. Wendt,** vice president and treasurer of the corporation who has served as temporary head of the Manufacturing Division since 1945. Mr. Wendt will continue as chief financial officer of the company.

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C. W. Culbertson has been appointed metallurgical engineer for McNally Pittsburg Foundries Inc., Pittsburg, Kans.

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Allan W. Ainsworth has been admitted as a general partner in the Horace T. Potts Co., Philadelphia. **Thomas I. Potts** and **Edward R. Potts** will resume their former status as general partners.

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General Electric Co., Schenectady, N. Y., has established an affiliated manufacturing companies department, and has appointed Vice President **L. R. Boulware** as general manager. **E. J. Harrington** has been appointed manufacturing manager of the new department, and **Roy W. Johnson** marketing manager.

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S. H. Harrison has been appointed Pacific Coast manager of the Industrial Division, Westinghouse Electric Corp., Pittsburgh.

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Ward Dougherty, export manager, Machine Division, Osborn Mfg. Co., Cleveland, will leave shortly for London, England, where he will study latest developments in England's postwar heavy industries as they relate to the need for American foundry equipment.

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Dr. Charles M. Slack has been appointed director of research, Westinghouse Electric Corp., Pittsburgh. He succeeds **Dr. Harvey C. Rentschler** who is approaching retirement and who later will devote himself to completing certain research projects and to serving in an advisory and consulting capacity. **Dr. John W. Marden** has been named manager of a newly established molybdenum department at the Lamp Division.

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Thomas J. O'Rourke has been appointed vice president in charge of sales, American Lubricants Inc., Buffalo.

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Allis-Chalmers Mfg. Co., Milwaukee, has named **R. T. Stafford** as assistant to the vice president and **J. W. McMullen** as general manager of the Pittsburgh Works of the company. **D. G. McArn** continues as works manager of the Pittsburgh plant.

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Arthur G. Sanford, General Electric Co., Schenectady, N. Y., has been appointed supervisor of personnel for the company's chemical department, Pittsfield, Mass. **Everett W. Bickford** has been appointed manager of the Employee Relations Division of the department.

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Robert C. Tyson has been appointed assistant comptroller, United States Steel Corp., Pittsburgh, to succeed **James Fleming** who has retired. Mr. Tyson was formerly general accountant of the corporation.

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Republic Steel Corp., Cleveland, has elected **E. G. Resch** treasurer of the corporation. He is succeeded as assistant treasurer by **W. H. Maroney. W. W. Hancock,** formerly vice president, secretary and treasurer, was named vice president in charge of finance, and continues to hold the office of secretary.

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C. E. Platt, L. A. Young Industries of Canada Ltd., Windsor, Ont., has retired as vice president and general manager. He is succeeded by **C. W. Corben.**

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T. H. Bossert has been elected president and a director of New York Shipbuilding Corp., Camden, N. J. **D. A. Williams** has been elected vice president and works manager and **N. R. Parker,** vice president and treasurer, has been elected a director.

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Nevin F. Decker, United Aircraft Corp., East Hartford, Conn., has been promoted to assistant factory manager of Hamilton Standard Propellers Division of the corporation.

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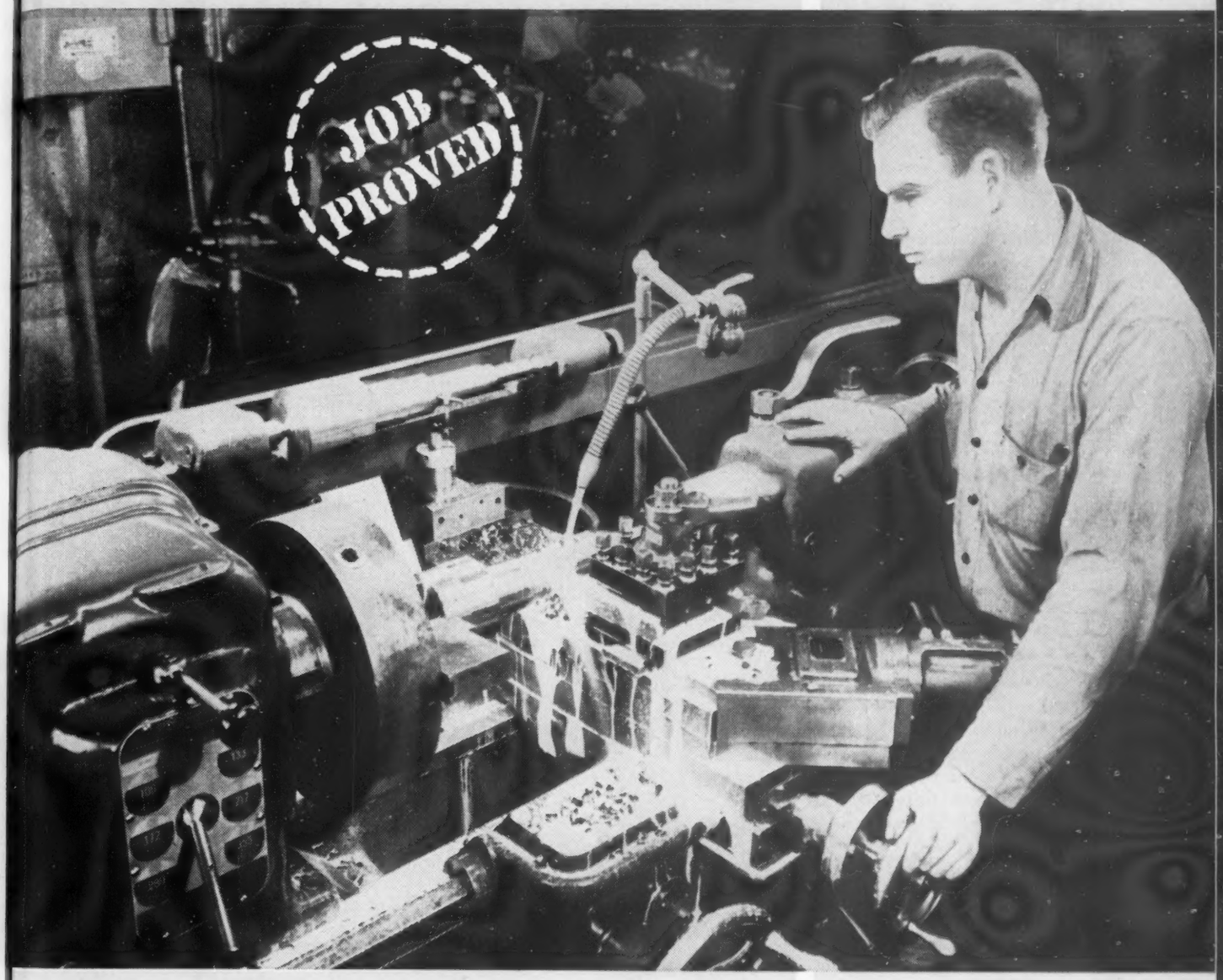
W. W. Timmis has been appointed general sales manager, Consolidated Industries Inc., Lafayette, Ind. He served during the war as director of the Metal Products Division, National Housing Agency, and director of the Plumbing

Turning S.A.E. 4145 Annealed . . . 315 S.F.P.M.



SUNOCO EMULSIFYING CUTTING OIL

Cools and Lubricates Carbide Tool Removing approximately 23 Cubic Inches of Metal per Minute

Here are the facts on a typical job where Sunoco Emulsifying Cutting Oil makes possible heavy cuts on annealed 4145 steel.

- **Operation:** Turning 4½" shaft and removing approximately 23 cu. in. of metal per minute
- **Machine:** 16" x 54" "AMERICAN" Pacemaker multi-production lathe
- **Material:** S.A.E. 4145 annealed steel
- **Spindle Speed:** 280 R.P.M.
- **Depth of Cut:** ⅜"
- **Cutting Speed:** 315 S.F.P.M.
- **Feed:** .017"
- **Type of Tool:** Cemented carbide
- **Cutting Lubricant:** 1 part Sunoco to 20 parts water

Sunoco Emulsifying Cutting Oil forms a stable emulsion when mixed with water. Its lubricating and cooling qualities make it particularly efficient for precision work at high speeds.

For more production . . . better finish . . . longer tool life . . . call your Sun Cutting Oil Engineer or write Department S-2.

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SUN

SUNOCO

INDUSTRIAL PRODUCTS

& Heating Division of the War Production Board.

—o—

Arthur E. Gibbs and **Charles L. Smythe,** Cleveland Graphite Bronze Co., Cleveland, have been promoted to sales managers. Mr. Gibbs will be in charge of the Chicago sales district and Mr. Smythe in charge of the Cleveland, Ohio and western Pennsylvania sales district. **Charles A. Williams** has been promoted to sales manager, Cleveland office.

—o—

M. Collins has been named manager of the Birmingham office of General Electric Co., Schenectady, N. Y., to succeed **R. T. Brooke,** retired.

—o—

The Worth Steel Co., Claymont, Del., elected the following officers at a meeting of the board of directors: **E. H. Worth,** chairman; **W. A. Worth,** president; **P. M. King, W. P. Worth** and **R. M. Worth,** vice presidents; **E. H. Worth Jr.,** treasurer; **G. D. Spackman,** secretary, and **T. Y. Moore,** assistant secretary. **W. A. Hagerman** was elected a director of the company. Other appointments were: **W. A. Hagerman,** general manager, **P. O. Zwissler,** manager of industrial relations, **A. W. Williams,** general manager of sales, and **P. H. Leinheiser,** purchasing agent.

—o—

Paul H. Fox has been appointed assistant general sales manager, Aluminum Division, Reynolds Metals Co., Richmond, Va. Prior to the appointment he was divisional manager for the Central States area. Mr. Fox will have his headquarters in Louisville.

—o—

D. R. Berg has been appointed manager of the Heating and Combustion Sections, Machinery Division, Dravo Corp., Pittsburgh.

—o—

Frank B. Powers has joined the Baldwin Locomotive Works, Philadelphia, as assistant to the vice president in charge of operations.

—o—

Dr. Ralph E. Menzel, associate professor of chemistry at the Michigan College of Mining and Technology, Houghton, Mich., has been elected chairman of the upper peninsula section of the American Chemical Society for this year.

—o—

M. F. Cotes has been appointed executive vice president of Motor Wheel Corp., Lansing, Mich. For the past 10 years he has served as vice president in charge of the corporation's Duo-Therm Division. Three new directors have been added to the board of the corporation. They are: **Byron L. Ballard, Donald F. Valley,** and **F. Carew Martindale.**

—o—

Arthur Farmer has been named general traffic manager, General Electric Co., Schenectady, N. Y. He succeeds **Charles E. Mochrie** who has retired after 35 years association with the company.

—o—

Elmer B. Jones, general traffic manager, Norton Co., Worcester, Mass., has been appointed Massachusetts member of the New England Governors' freight rate committee.

—o—

E. Riley Williams has been elected president in charge of foreign business, Worthington Pump & Machinery Corp., Harrison, N. J.

—o—

Vincent Manka has been elected vice president, Claud S. Gordon Co., Chicago. He formerly served as general sales manager of the company.

—o—

Paul F. Neess, Perfex Corp., Milwaukee, has been appointed manager of controls sales engineering. **Richard E. Toellner** was named district manager at Detroit.

—o—

Edgar M. Hastings, chief engineer of the Richmond, Fredericksburg & Potomac Railroad, has been elected president of the American Society of Civil Engineers for 1947.

—o—

Frederick C. Abbott has been appointed manager of labor and personal relations, Pennsylvania Salt Mfg. Co., Philadelphia. He was previously assistant production manager.

—o—

C. E. O'Connor, formerly manager, Syracuse, N. Y., branch, Crucible Steel Co. of America, New York, has been appointed consultant. He will be located at Syracuse. **H. B. West,** previously sales representative and office manager, was named manager of the branch.

—o—

Robert G. Luster, associated for 24 years with Clyde Iron Works, Duluth, has been appointed vice president in charge of sales of a new corporation which will be known as the Superior-Ledgerwood-Mundy Corp., Superior, Wis.

—o—

Robert S. Solinsky has been elected president, Can Manufacturers Institute, for 1947. Mr. Solinsky is president of Cans Inc., Chicago.

—o—

Harvey F. Berghaus has been elected to the board of directors, American Coach & Body Co., Cleveland, and also vice president in charge of manufacturing. He will continue his present duties as assistant secretary of the company.

—o—

Albert J. Bauer has been appointed sales representative in the Rocky Mountain states for Joseph T. Ryerson & Son Inc., Chicago. He will maintain head-

PAUL H. FOX

VINCENT MANKA

HARVEY F. BERGHAUS

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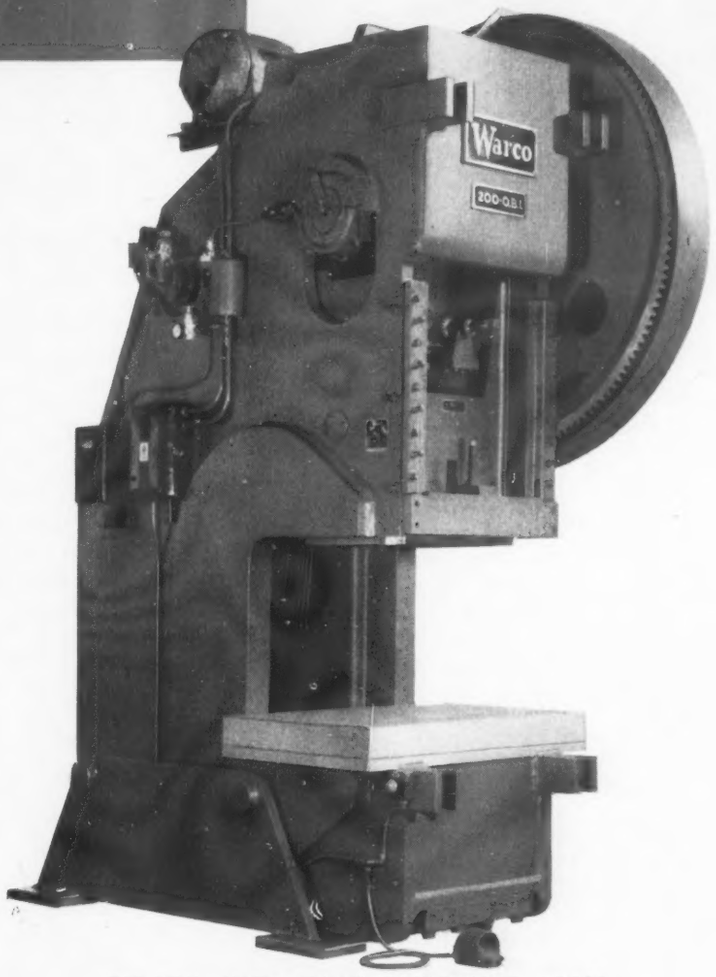

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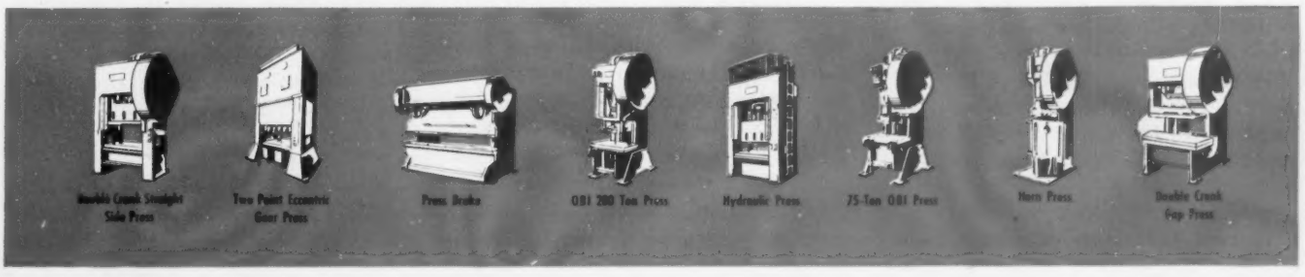


JOHN F. BLACK

L. C. FITZGERALD

C. A. WIKEN

quarters at Denver. **E. F. Wood,** formerly in charge of the firm's Denver office, has been assigned to the Ryerson Los Angeles steel-service plant as manager of the work order department.

—o—

John F. Black has been appointed general superintendent of the Buffalo plant of Wickwire Spencer Steel Division, Colorado Fuel & Iron Corp., Denver. He was formerly associated with Atlas Steels Ltd., Welland, Ont.

—o—

M. C. Forgrave has been appointed plant purchasing agent at Newark, O., for the Reynolds Metals Co., assuming his new post Feb. 1. For eight years he was associated with Battelle Memorial Institute, and for the past five years has been with the Barnebey-Cheney Engineering Co. and the American Solvent Recovery Corp., Columbus, O.

—o—

S. M. Felton has been re-elected president of American Railway Car Institute, New York. Other officers also re-elected are: Vice presidents, **W. J. Curley, R. A. Williams,** and secretary-treasurer, W. C. Tabbert.

—o—

A. T. Colwell has been appointed chairman of the Society of Automotive Engineers Inc., New York, for 1947. Mr. Colwell who is vice president of Thompson Products, Cleveland, succeeds **J. M. Crawford,** General Motors Corp., Detroit, as SAE chairman.

—o—

C. V. Murphy, American Car & Foundry Co., New York, has been appointed sales agent at the Huntington, W. Va., office of the Mine Car Sales Division. He succeeds **F. J. Bogard** who has been assigned free lance sales duties in which he will cover the entire bituminous coal region.

—o—

Howard L. Dingler, General Motors Corp., Detroit, recently general purchasing agent for the Chevrolet Division in Cleveland, has been transferred to the central manufacturing staff of General Motors Corp. **A. F. Swetish,** associated with the General Motors central staff, has been transferred to the industrial engineering section.

—o—

L. C. Fitzgerald, General Motors Corp., Detroit, has been named manager of a Chevrolet Motor Division to open soon in Van Nuys, Calif. Plant superintendent at Van Nuys will be **Harold Lothringer,** former general superintendent of Chevrolet's No. 1 aviation plant, Tonawanda, N. Y.

—o—

The Willard Storage Battery Co. of California, subsidiary, Electric Storage Battery Co., Philadelphia, has named **Norman W. Jones** works manager of the Portland, Oreg., plant.

—o—

Adrian D. Joyce, president, Glidden Co., Cleveland, since it was founded in 1917, has been elected chairman of the board of directors. He is succeeded as president by his son, **Dwight P. Joyce,** who has been a vice president and director of the company. Three new directors named to the board are **John P. Ruth, Lovell Y. Pulliam** and **Alexander D. Duncan. R. H. Horsburgh** was named vice chairman of the board and **R. W. Levenhagen** chairman of the executive committee. Directors who were re-elected include all of the above named officers and **P. E. Sprague, W. J. O'Brien, John A. Peters** and **Clifton M. Kolb. Newell Beatty,** general manager of Durkee Famous Foods Division for the Pacific coast, was elected vice president, as was **Alexander D. Duncan,** general manager of the Paint & Varnish Division, Cleveland.

—o—

Dr. G. M. Butler, Allegheny Ludlum Steel Corp., Pittsburgh, who has been associate director of research in charge of tool and die steel and allied products for the corporation, as well as chief metallurgist at its Dunkirk, N. Y., plant, will devote his time exclusively to duties as associate director of research. **J. A. DeFries** has been appointed chief plant metallurgist at Dunkirk to succeed Dr. Butler.

—o—

C. A. Wiken, Rockwell Mfg. Co., Pittsburgh, has been promoted to vice president in charge of engineering. For the past 8 years he was chief engineer of the Delta Mfg. Division in Milwaukee. **J. E. Ashman** has been named controller of the company. He was formerly associated with Carnegie-Illinois Steel Corp., a United States Steel subsidiary. **A. E. McIntyre,** for the past several years manager of the Nordstrom Valve Division plant, Oakland, Calif., has been transferred to Pittsburgh as general manager of the company's Pittsburgh Equitable Meter Division.

—o—

E. C. Kron, formerly with Battelle Memorial Institute, has joined the Doehler-Jarvis Corp., New York, as metallurgist in charge of steel and iron activities. He will make his headquarters at the Toledo, O., plant.

—o—

B. J. McLaughlin has been appointed district sales manager, Philadelphia territory, Wright Mfg. Division, York, Pa., American Chain & Cable Co. Inc.

—o—

A. J. Jones has been appointed to the Field Engineering Service Department, Landis Tool Co., Waynesboro, Pa. He will work in New England through Stedfast & Roulston Inc., distributors for that territory.

—o—

Clarence H. Hopper, general superintendent, ACF-Brill Motors Co., Philadelphia, has been promoted to production

G. LAWTON JOHNSON

New assistant general sales manager, National Tube Co., Pittsburgh, U. S. Steel Corp. subsidiary. Noted in STEEL, Feb. 3 issue, p. 88

manager in charge of all production departments at the Philadelphia plant.

—o—

James E. Fitzgerald and **Harvey E. Zens Jr.** have joined Udylite Corp., Detroit, in the sales organization.

—o—

Fred E. Harrell, general works manager and a director of the Reliance Electric & Engineering Co., Cleveland, has been elected manufacturing vice president of the company. He has been associated with Reliance since 1924.

—o—

E. B. Maire, General Controls Co., Glendale, Calif., has been appointed regional sales manager of the company's mid-western, southern and eastern branch office territories.

—o—

Henry A. Mullen, Ampco Metal Inc., Milwaukee, has been elected chairman of the Alloy Group of the Resistance Welder Manufacturers' Association for 1947.

—o—

Charles E. Love has been appointed general sales manager, International Business Machines Corp., New York.

—o—

The Ford Motor Co., Dearborn, Mich., has announced the following personnel changes: **A. R. Davis,** plant manager at Kansas City, has been appointed manager of the new Lincoln-Mercury assembly plant at Los Angeles. **P. S. Mabie,** plant manager at Memphis, Tenn., becomes plant manager of the new Lincoln-Mercury plant at St. Louis. **Henry C. Dorsey,** until recently a supervisor in the Dearborn branch, has been appointed manager of the new Ford plant at Atlanta.

—o—

K. W. Warren has been appointed sales manager, Federal-Mogul Corp., Detroit. **Thomas J. Marshall** has been appointed assistant sales manager.

—o—

Frank W. Warner Jr., General Electric Co., Schenectady, N. Y., has been named engineering policy manager of the company's Chemical Department, Pittsfield, Mass. He formerly served as engineering manager of the Plastics Division. **Arthur G. Gustafson** has been named manager of the Construction Division of the Chemical Department.

—o—

Eldon E. Achberger, works manager of the Perfex Corp., Milwaukee, has been elected a vice president of the corporation.

—o—

E. R. Bisard, Renown Stove Co., Owosso, Mich., has been promoted to purchasing agent for the company.

STEWART WALLS

Promoted to factory manager, Axle Division, Eaton Mfg. Co., Cleveland. Noted in STEEL, Feb. 3 issue, p. 90

—o—

Norman C. Irion, director of purchases for American Type Founders Inc., Elizabeth, N. J., has been named general manager of Daystrom Laminates Inc., Daystrom, N. C., an ATF associate. **Donald J. Gildea** has been named purchasing agent for the Manufacturing Division, American Type Founders Inc.

—o—

Charles S. Brown, Ford Motor Co., Dearborn, Mich., has been appointed purchasing agent for the Lincoln Division. He was formerly assistant purchasing agent for Ford Motor Co. and is succeeded in that position by **A. E. Conn,** formerly buyer of steel forgings. **Frank B. Christian** will take over purchasing of steel forgings.

OBITUARIES . . .

Russ J. Christy, 84, died recently at his home in Smyrna, Fla. He was the founder of the Christy Co., Fremont, O.

—o—

Henry Van Bogart, 83, died Feb. 3 at his home in Cleveland. He had been an executive of the Van Dorn Iron Works Co., Cleveland.

—o—

Theodore J. Katz, 53, Wauwatosa, Wis., was killed Feb. 1 in an airplane crash. He had been sales manager for the U. S. Machine Corp., Lebanon, Ind., in charge of the Milwaukee area.

—o—

William A. Bierman, 72, president of the O. C. Duryea Corp., Pittsburgh, died recently.

—o—

George A. Bryant, 53, traffic manager, McWane Cast Iron Pipe Co., Birmingham, died recently after a brief illness.

—o—

John W. Logan, 73, retired secretary and treasurer of the Alan Wood Steel Co., Conshohocken, Pa., died recently. He had been associated with the company for 42 years.

—o—

Paul B. Farnsworth, 48, died recently. He had been chairman of the board of the Eastern Machinery Co., New Haven, Conn.

—o—

Laurence R. Blackhurst, manager of the Products Division in the Plastics Department of E. I. du Pont de Nemours Co., Wilmington, Del., died Jan. 31.

—o—

Harry U. Badeau, 66, secretary and sales manager, Centrifix Corp., Cleveland, died Jan. 28 at his home. Mr. Badeau was also a director of the Centrifix Corp. and of the Hawley Engineering Corp.

—o—

Dr. Gustav Thurnauer, 79, died recently. He was one of the founders of Aurora Metal Co., Aurora, Ill., and at the time of his retirement was chairman of the company.

—o—

Norman J. Hittinger, 47, manager of public relations, Bethlehem Steel Co., Bethlehem, Pa., died Feb. 2 in that city. He had been with Bethlehem Steel since 1925.

—o—

Dr. Otto Sussman, chairman of the board of the American Metal Co. Ltd., New York, died at his home in that city after a long illness.

—o—

James M. Davis, formerly associated with American Steel & Wire Co., Cleveland, died recently in Florida.

High-Temperature Protection FOR MILD STEELS

By WILLIAM N. HARRISON
DWIGHT G. MOORE
JOSEPH C. RICHMOND
National Bureau of Standards
Washington

NEW type of ceramic coating for protecting mild steels in high temperature service was developed during the war at the National Bureau of Standards and was used by the Army and Navy on the exhaust systems of certain aircraft and other vehicles.

Outstanding features of these coatings are: (a) High resistance to chipping under repeated thermal shock, (b) protection of the metal against oxidation during prolonged exposure to temperatures up to about 1250° F, (c) freedom from the cracking and blistering produced in conventional porcelain enamels under comparable conditions of high temperatures and severe thermal gradients, and (d) a mat surface which does not show highlights and therefore, decreases visibility.

Early in the war, supplies of many materials were inadequate to meet essential war demands. Nickel and chromium were particularly scarce because of the greatly increased demand and also because the normal importation of these metals was endangered.

To alleviate the situation, a project was undertaken at the National Bureau of Standards which included: (a) Development of special heat-resistant ceramic coatings for low carbon steels, which could then be substituted for nickel-chrome steels in many applications, and (b) testing of the new coatings in direct comparison with the conventional type of glossy porcelain enamels as exemplified by those used on the exhaust manifolds of some automobile engines.

Some of the new coatings gave superior test perform-

Fig. 1—Effect of 20 per cent admixtures of various oxides on fusion properties of "hard" porcelain enamel ground-coat frit prepared as cylinders 5/8-in. diameter by 3/4-in. high and fired for 10 min at 1600° F. Note sharp edges remaining on specimen containing Al_2O_3

Newly-developed ceramic coatings feature high resistance to chipping under repeated thermal shock, and protection of metal against oxidation during prolonged exposure to temperatures up to about 1250° F. Refractory properties of ground coat frits tested on aircraft exhaust systems improved with 20 per cent admixture of alumina

ance and were described in a report to the armed services dated June, 1943. This article comprises extracts from that report and supplementary information on service tests, compositions and the use of the coatings in production of parts for the armed services. A more detailed report is published in the *Journal of Research* of the National Bureau of Standards.[1]

In order to avoid the necessity for extremely high smelting temperatures, conventional ground-coat frits were used, and refractoriness of the coatings was increased by mill additions. Zirconium oxide, titanium dioxide, ferric oxide, aluminum oxide, chromic oxide, silicon dioxide, silicon carbide, feldspar, mullite and chrome ore were added in various amounts, both singly and in combinations.

These coatings were milled, applied, and fired by the methods used for porcelain enamels. The specimens were then examined for surface texture and adherence. Those that showed promise were heated for short periods at 1650° F in order to obtain an indication of their resistance to deterioration at high temperature. Of the various coatings tested, those containing alumina gave the best results.

It was found that the type of alumina used greatly influenced the properties of the coating. In general, alumina calcined at low temperatures produced the most desirable coatings, and A-1 alumina, as produced by the Aluminum Ore Co., was finally selected as well suited for the coatings in view of its properties and availability.

In the early development work, it was noted that alumina had a powerful effect in raising the resistance of the coatings to flow at elevated temperatures. To obtain more specific comparisons, a representative "hard" ground-coat frit was dry-ground to a fineness such that about 1 per cent was retained on a number 200 sieve and, at the same time, a number of refractory admixtures were ground to approximately the same fineness. Mixtures were prepared from the resulting powders in the ratio of 80 per cent of frit to 20 per cent of oxide by weight, and cylinders ⅝-in. diameter were dry-pressed. After drying, these cylinders were reduced to a uniform length of ¾-in. The cylinders were fired for 10 min at 1600° F, then cooled slowly to room temperature.

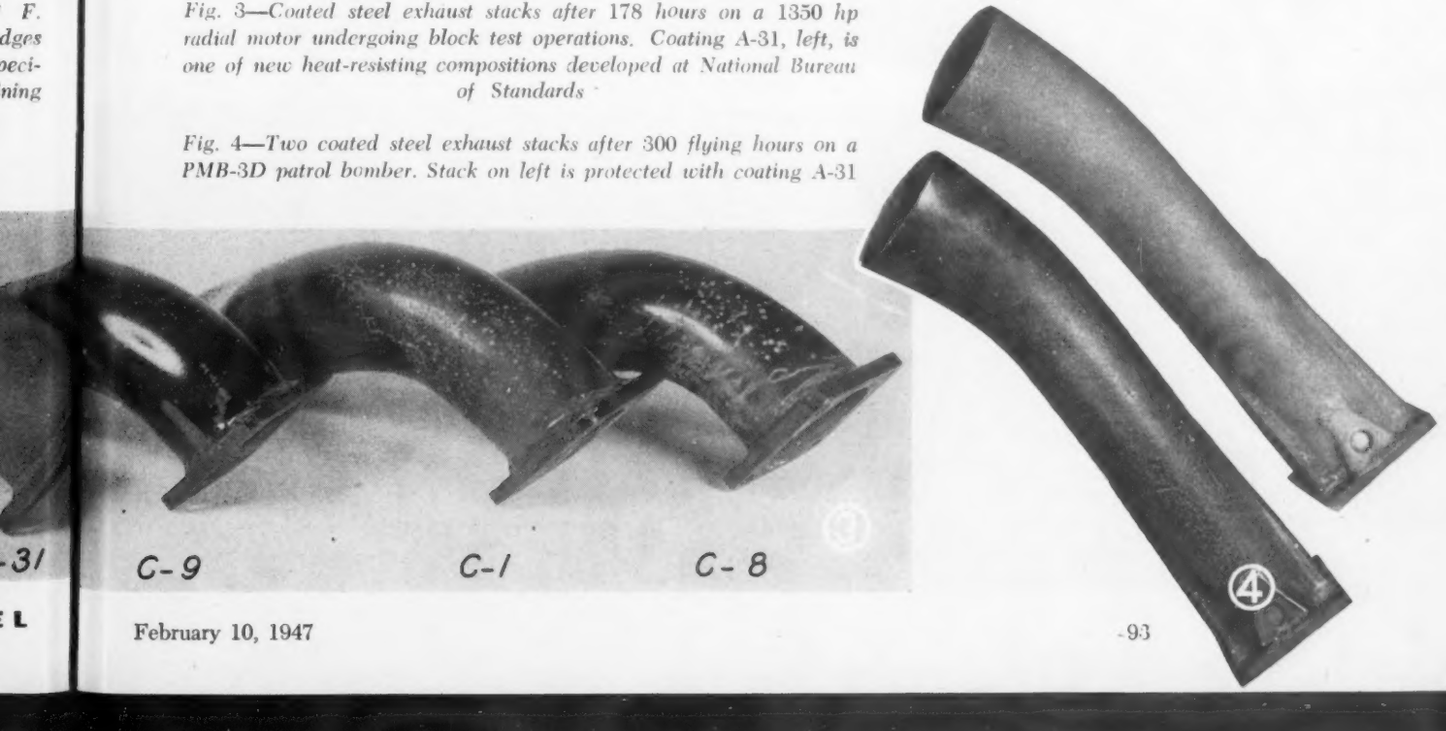
Fig. 1 shows the results of these tests. The frit (No. 11) with no addition fused to a button while the same frit with an admixture of 20 per cent by weight of A-1 alumina maintained its original sharp edges. The other oxide admixtures were not particularly effective in reducing the high temperature flow of the frit. The relatively large size of the buttons with chromic oxide and iron oxide admixtures was caused by the bubble structure and indicates a gas-forming reaction during the firing operation.

Four of the coatings prepared with the alumina were outstanding in their effectiveness, (*Please turn to Page* 120)

Fig. 2—Sections of coated steel collector rings after operation on a 450 hp 9-cylinder Continental motor on dynamometer tests. Part at right protected with one of the poorest conventional enamel coatings has undergone 13.5 hours of test and shows pronounced chipping and cracking of coating. Part at left is coated with A-31 and has undergone 120 hours of testing on the same motor

Fig. 3—Coated steel exhaust stacks after 178 hours on a 1350 hp radial motor undergoing block test operations. Coating A-31, left, is one of new heat-resisting compositions developed at National Bureau of Standards

Fig. 4—Two coated steel exhaust stacks after 300 flying hours on a PMB-3D patrol bomber. Stack on left is protected with coating A-31



Submerged

OPERATING performance of two locomotives equipped with welded boilers is being closely observed by Canadian Pacific Railroad engineers following the initiation of a nine-point program of possible improvements in boiler construction. Canadian Pacific mechanical experts hope that the new fusion welded boilers will eliminate or reduce considerably some of the problems now encountered in boiler service.

Work carried out by the mechanical engineering department of the C.P.R. resulted in the fitting by the Montreal Locomotive Co. of two new "1200" class engines (4-6-2 wheel arrangement) with the new boilers, built by American Locomotive Co., Schenectady, N. Y. They are said to be the first locomotives of this type to operate on Canadian lines, and are being run in regular service under varying operating conditions.

Decision to try them was prompted by the good service obtained from fusion welding in other instances, including a welded-boiler locomotive now in service on the Delaware and Hudson. Permission of the Board of Transport Commissioners of Canada was necessary for installation of the boilers.

The boilers were built to operate at a working pressure

Fig. 1—Welding third course wrapper sheet and throat sheet

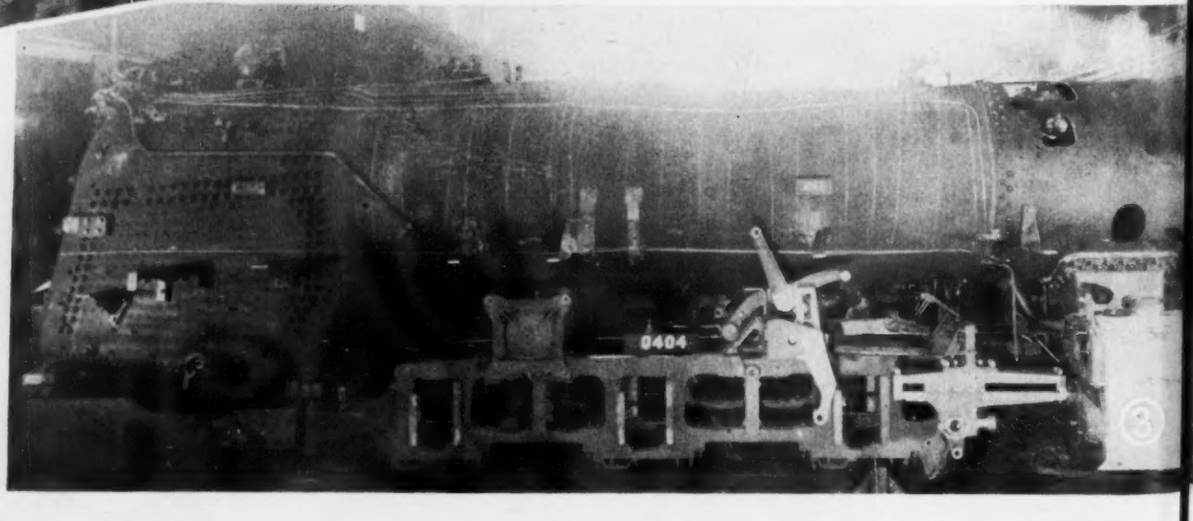
Fig. 2—Welding outside of longitudinal seams

Fig. 3—Boiler mounted on frame

Fig. 4—Preparation of longitudinal seam, showing draw bolts and tack welds

Fig. 5—Welding outside girth seam between first and second courses and large auxiliary ring used to compensate for eccentric course

Fig. 6—Subassembly of front tube sheet with mounting flange



Melt Welding of Locomotive Boilers

Automatic submerged melt welding process used to join longitudinal and girth seams of boilers built to operate at working pressure of 250 psi. Stress relieving performed in fully automatic car-bottom indirect heating furnace

of 250 psi with a factor of safety of five and an allowable joint efficiency of 90 per cent. They differ from the Delaware and Hudson Railroad's boiler in that the barrel portion consists of three barrel courses butt-welded together and that a man-hole opening is provided in the third course to facilitate internal inspection in place of the conventional steam dome. The foundation rings are cast steel with single rivet construction; caulking edges of the inside and outside firebox sheets are seal welded.

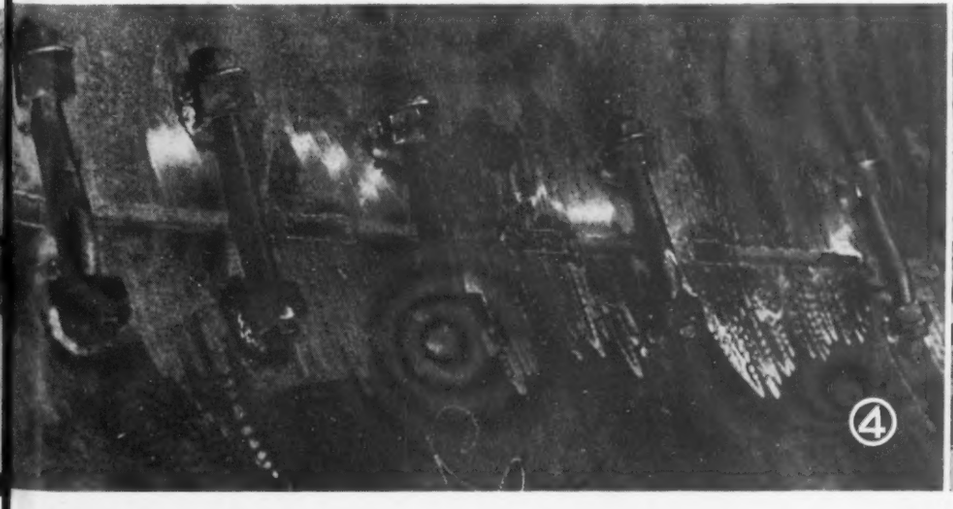
The smoke box is fastened to the first course by riveting to facilitate changing the smoke box which is renewed three to four times during the life of a locomotive boiler. The wrapper sheet consists of a three-plate construction which permits using a heavier sheet over the crown, thus eliminating the need for a liner, which is generally used to stiffen the crown of one-piece wrapper sheets.

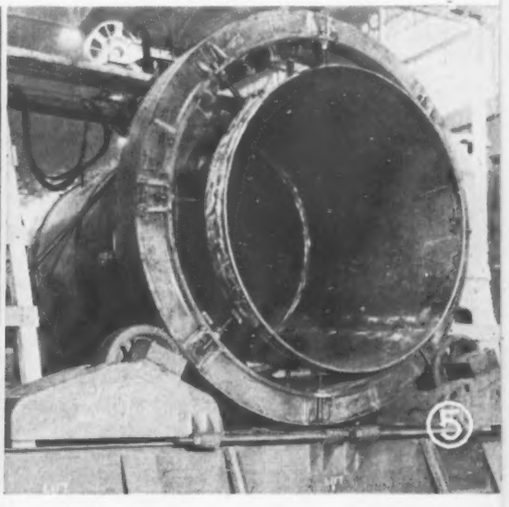
The man-hole is flanged from 1-in. plate and has a 17-in. diameter opening, with an overall diameter of 34½-in. fitted into the third course and attached with double-welded butt-weld. The boiler shell opening at the man-hole is reinforced with a liner 1⅛-in. thick 25 in. ID by 40 in. OD which is attached to the man-hole flange and boiler shell by fillet welds at both the inside edge and the outside edge of the liner.

Pads for top check, washout opening, bracket attachments for dry pipes and other internal and external fittings are fillet welded to the boiler shells prior to the stress relieving heat treatment. All washout plug bushings and flexible staybolt sleeves are seal welded to the backhead, wrapper sheet and throat sheet after the boiler had been stress relieved. The firebox door opening is formed in the usual manner, by flanging the outside back head inward and the inside back head outward. The two edges are joined together by a single welded butt-weld.

The front tube sheet is of the same design as that used in the Delaware & Hudson all-welded boiler. It consists of a circular ring 1¼-in. thick by 4⅜-in. wide, with a recess at the water side in which the tube sheet is fitted and fillet welded both sides. The complete tube sheet assembly is then fitted and fillet welded to the first course. The ring is provided with slots at the top and bottom centers in order that the tube sheet can be renewed without cutting any of the welds except those directly attaching the tube sheet to the circular ring.

Plates used in the boiler shells were carbon steel to ASTM specification A-201, (*Please turn to Page* 125)

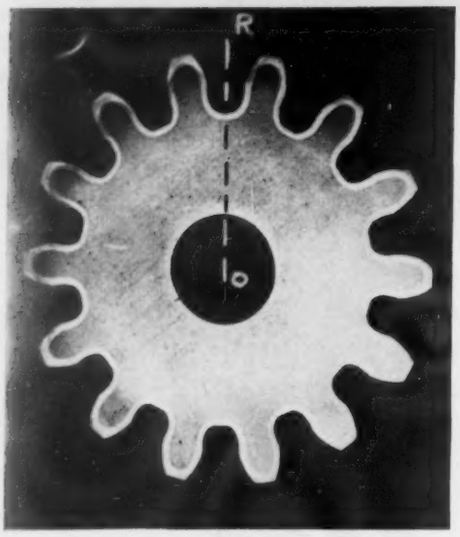


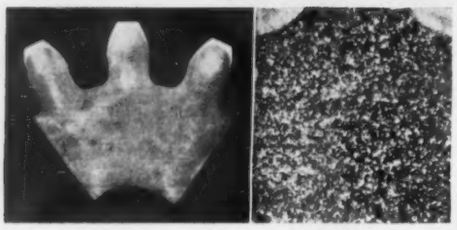


In this concluding article, the authors advance reasons for surface hardening steel parts, explaining case depth, factors influencing it. Generator power, production fixtures, coil design, quenching aids and metallurgy were discussed in previous four articles

Induction Hardening OF STEEL

By Dr. D. L. MARTIN
Metallurgist
Research Laboratory
And
R. A. GEHR
Application Engineer
Industrial Heating Engineering Div.
General Electric Co.
Schenectady, N. Y.





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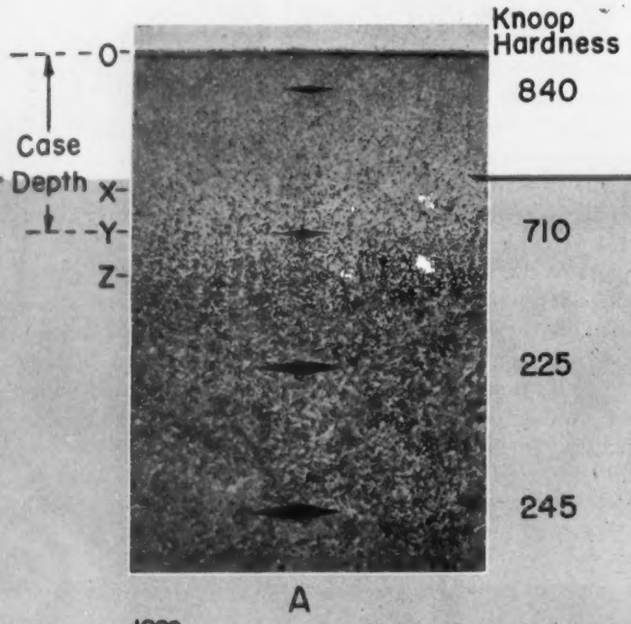
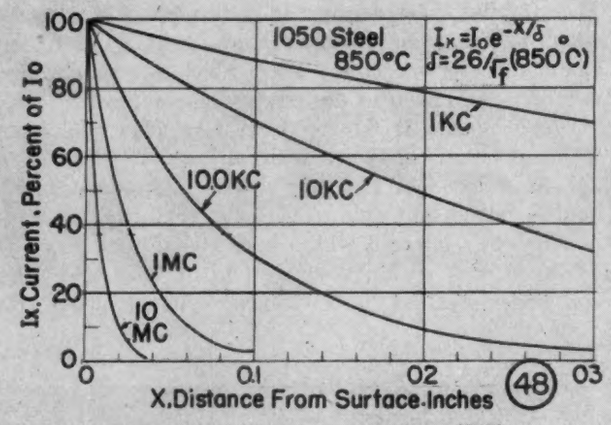
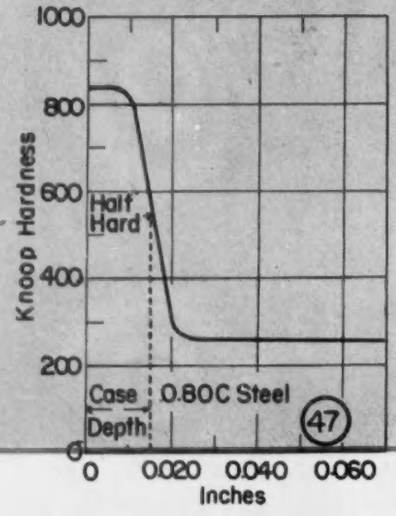
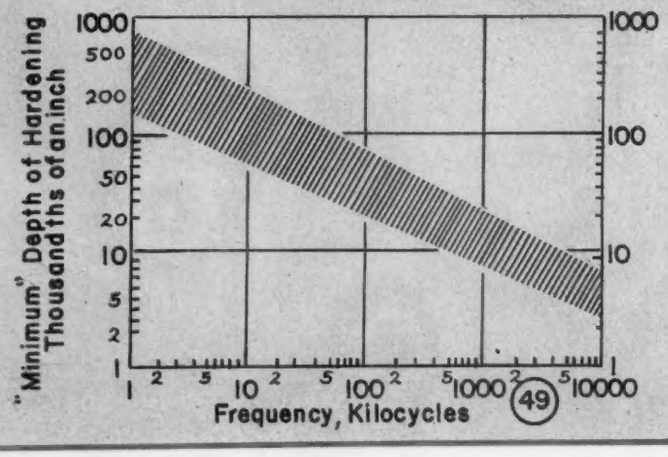








UP TO this point in the previous discussions, it was assumed that it is desirable to case harden steel by induction methods, without stating reasons for surface hardening of steel parts.

There are many parts in modern machinery where the surface must be hard to resist wear, yet be strong and tough to resist fatigue and impact loads. For example, in automobiles the transmission gears, starter ring gears, camshafts, drive pinions, etc. are parts requiring high wear resistance, load carrying ability, resistance to shock and repeated cyclic stressing. To meet these service requirements the component must have surface hardness plus toughness.

Since hardness and toughness are opposite properties, the only satisfactory way of combining these two characteristics in a steel part is by case hardening. The ferritic matrix of the core supplies the toughness and the martensitic case (or nitrided case) provides the wear-resisting qualities. As a result it is possible to produce a case hardened part (carburized, nitrided, induction hardened, etc.) which has a remarkable combination of physical properties to resist wear (abrasion, scoring, galling, or pitting), fatigue, plastic deformation, and impact. Case hardening, however, will not solve all service problems. When used certain precautions must be taken to insure uniformity and quality, and to guard against incorrectly hardened specimens.

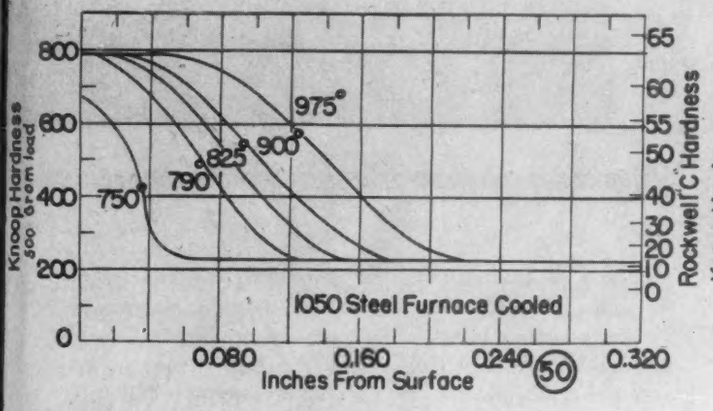
How Deep Should the Case Be? The depth of the martensitic layer is determined by service requirements, subsequent machining and grinding operations, core properties and relative costs involved.

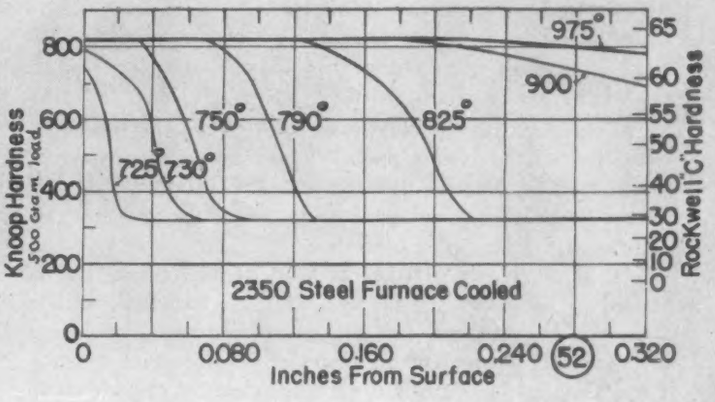
The engineer generally must base his design (that is, case depth requirements) upon past experience, as there are at present no definite equations or rules that enable him to calculate accurately the case depth. He has information on permissible wear, estimated service loads, and physical properties of the steel to help him estimate his design, but his results are likely be tempered with past experience on similar parts.

If wear resistance is the main requirement, and the unit loads are low, a thin case, less than 0.020-in. may prove satisfactory. On the other hand, if the service stresses are high, a heavy case depth, over 0.060-in., may be required to prevent crushing of the hard shell.

Increase in the case depth will likely increase distortion. Consequently, final machining and grinding costs will increase. If a heavy case is required to meet service requirements, allowance should be made for final grinding operations where excessive metal may be removed from one side of a sample in order to produce an undistorted part. Induction hardening offers some advantage in this connection, since the distortion for a constant case depth is likely to be less than when the part is case carburized. Therefore, final grinding is reduced to a minimum.

Core properties limit the case depth, because the properties of the surface zone are dependent to a large degree upon the backing-up provided by the core. If tensile properties of the core are low and the stresses high, a deeper case will be required than if the core is strong. Pitting of gears in service is reported to be related to the condition where the core is soft (*Please turn to Page* 132)





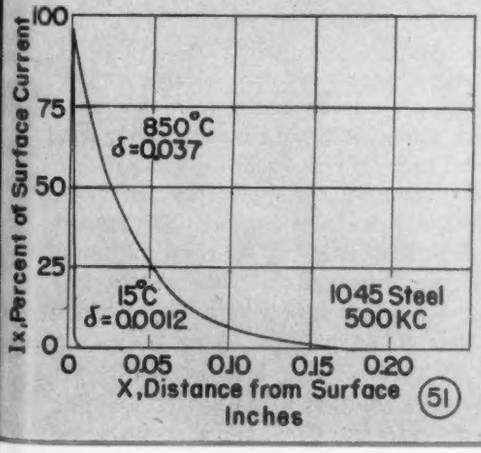


Fig. 46—Nonuniformity of case depth in induction-hardened gear. Note in B and C that root was not hardened uniformly across face. Fig. 46A—End section of 2-in. spur gear with 3/16-in. face width. Fig. 46B—Section through center of face showing hardening only at tip. Fig. 46C—Section RO through root, showing hardening only at edges

Fig. 47—Case depth determination in induction hardened steel. Fig. 47A—Case depth is chosen as OY; initial magnification X75. Fig. 47B—Hardness penetration curve showing half-hard method of determination of case depth Fig. 48—Effect of frequency on current penetration in SAE 1045 steel at 850° C Fig. 49—Effect of frequency on minimum depth of hardening. Case depth band is empirical; indicates approximate case depth values expected in practice Fig. 50—Effect of increasing surface temperature on hardness penetration of induction hardened 1050 steel; degrees C, and quenched. Fig. 51—Temperature effect on current penetration; 1050 steel, frequency 500kc. Fig. 52.—Effect of increasing surface temperature on hardness penetration of induction hardened SAE 2350 steel; degrees C, and quenched

Seen and Heard in the
Machinery Field

By GUY HUBBARD
Machine Tool Editor

CLEAN SHOPS: Good housekeeping is a tradition down in southern Pennsylvania. Therefore, it is not surprising that Waynesboro is a neat town in which good housekeeping prevails in industry as well as in the homes.

After spending a day at the Landis Tool Co., I am convinced that there is a lot more to good plant housekeeping than simply the good impression which it makes on visitors like myself. I am convinced that it pays off in safety, in work quality and also in employer-employe relations.

Keeping a shop clean is much the same as keeping a man clean. Most of us need to be prodded by conscience or our families or the boss, to keep our clothes pressed, to shave every day and to take more than the traditional Saturday night bath. When we stop doing those things, we start to slip—physically and mentally. That is why the British army insisted on the daily shave, even though it had to be done with cold tea in the trenches.

The same progressive slipping is all too easy in an industrial plant. Let the windows get dirty and then machines are not wiped, piles of rubbish begin to accumulate unnoticed in corners, bad work begins to get by, good men begin to drop out of the organization and sloppy workmen come in to take their places.

The progressive decline is something like the results of the loss of the historic nail: "For want of a nail a shoe was lost; for want of that shoe a horse was lost; for want of a horse a king was lost—and so a nation was lost, all through the lack of a horseshoe nail!"

It is much easier today to keep a plant clean than it used to be in years gone by. Machine tool builders not only in Waynesboro, but also in other machine tool centers have been among the first to take advantage of such innovations as industrial vacuum cleaners, down draft exhaust systems for casting cleaning and spray painting operations, precipitators for oil mist, vacuum systems for dust, fume and chip removal, and so on.

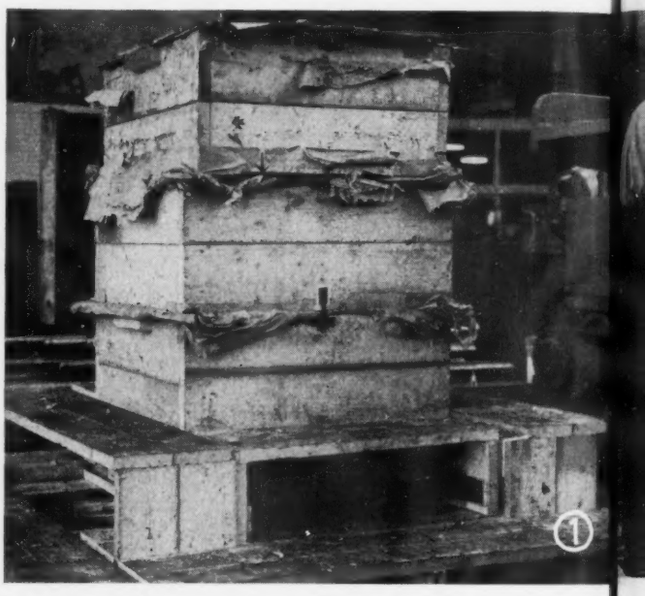
It is no accidental circumstance that in such shops the accident rates are low, the quality of workmen high, labor difficulties few and quality and quantity of output satisfactory. It is natural for good men to gravitate to good shops, and the good ones are the clean ones.

MIGRATORY ENGINEERS: Once upon a time young men who aspired to engineering careers, but who at the same time wanted to be foot-loose and fancy free in the high laced boots, leather jacket and broad-brimmed hat traditions of Richard Harding Davis, went in for civil engineering and all that this implies.

OFTEN, in searching for some means of overcoming a problem, engineers find that the manner in which it is solved not only proves of instructive value, but leads to the adoption of a production method that out-performs a previous one.

Such a situation turned up recently in the Frank-Kneeland plant of United Engineering & Foundry Co., Pittsburgh. Here it was learned that with dry ice roller bearings could be shrunk fitted on their respective seats of huge eccentric shafts easily, and in much less time than the old method.

Problem involved two eccentric shafts for a pair of hydraulic pumps—each with five throws of 16.00 in. in diameter requiring five roller bearings with 15.990-in. bores to be shrunk on their respective seats. Bores of the roller bearings were 0.010-in. smaller than the diameter of the eccentrics. This to-



Others of less romantic turn-of-mind, set their sights on some established industry in some old community. They would start in at the bottom, win promotion through long and faithful service, marry the boss' daughter and eventually would live in the big-house-on-the-hill. To those ends they studied mechanical or electrical engineering.

Now that the civil engineers have to a large degree completed their more sensational jobs out in the great open spaces and are settling down to build subways, to rebuild highways and to control rivers in the more highly civilized parts of the country, it is noticeable that more and more mechanical and electrical engineers in turn are being called upon to pull up stakes in the older industrial centers and to move to distant places where mechanical and electrical engineering activities were undreamed of only a few years ago.

People who bewail the fact that here in the United States there are no more frontiers to push back, are just as wrong as was Alexander the Great when he sat down

Plant Freezer

FOR FITTING HUGE ECCENTRIC SHAFTS

gether with the close spacing of the throws, it was felt, would provide a tolerance a little too close for comfort—even if the bearings were heated to a little over 200° F to obtain an expansion of about 0.024-in. to make the tolerance over the eccentrics' diamter 0.014-in. Another complicating step was slipping the bearings over at least two fits to reach the center eccentric seat. To gain the tolerance sought, it was decided to freeze the shafts.

Accompanying views illustrate steps taken in the procedure. Fig. 1 shows container built to hold the shafts. It consists of a double-walled box made in three sections to facilitate packing dry ice around throws of the shaft. (*Please turn to Page* 108)

and wept because—having conquered the whole world—there was nothing left for him to do in the conquering line.

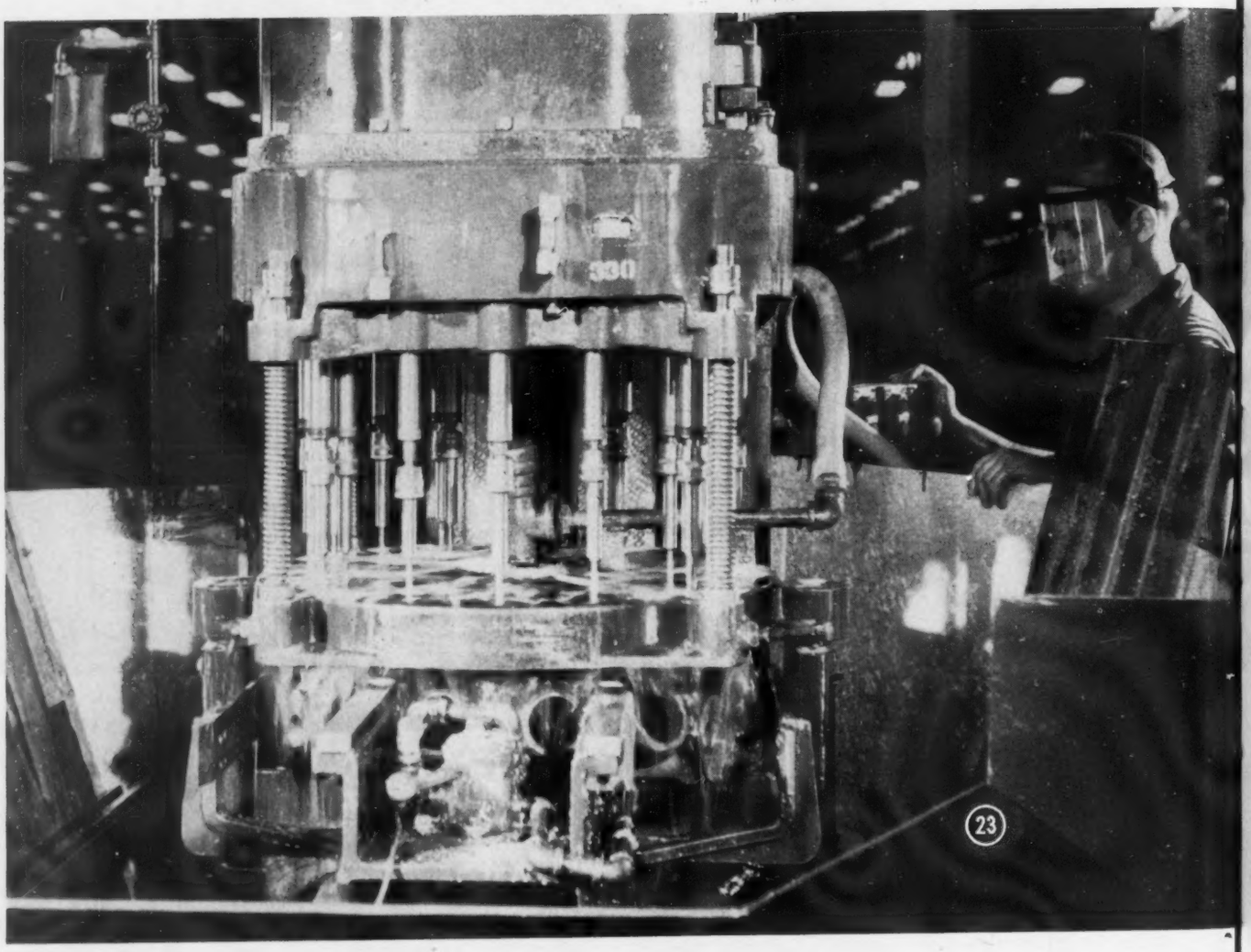
During the war great impetus was given to manufacturing west of the Mississippi. Great plants were built in Kansas and Oklahoma and Texas and elsewhere throughout the central west, the southwest and the far west. They have had a taste of mass production out in that part of the country, they have made a success of it, they like it, and they are determined to continue with volume output methods.

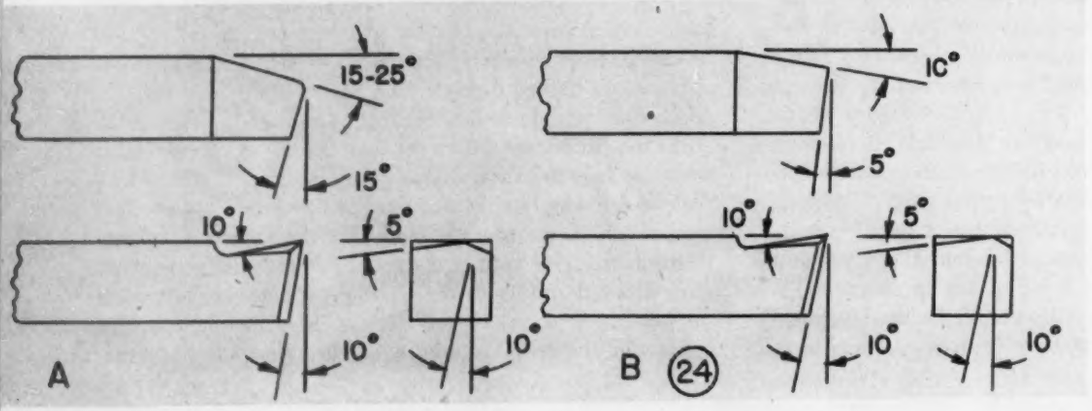
It is a sign of the times that the American Society of Tool Engineers is going to hold its Fifteenth annual meeting at Houston, Texas, March 19 through 22, 1947. It is going to be a healthy experience for a lot of people from the northeast to get down there in the southwest and see in what a big way a lot of big mechanical engineering and manufacturing projects are being developed and operated. It will renew their faith in the future of the United States.

SLOW ON UPTAKE: In Germany, use of slave labor forced a great increase in research, especially on problems of monotony, fatigue and work pace, a report picked up by the Office of Technical Services, Washington, revealed recently. Many valuable research findings, however, were never applied in industry. Although the Germans were painstaking and thorough in safety research, they seemed surprisingly slow in using good ideas. Even lessons in floor sweeping are given as part of the German apprentice's safety training, the report states. When an apprentice completes his training he is already acquainted with the safety practices of his trade. Consequently, when he fails to use available safety devices, it is assumed that he knowingly risks the dangers involved. Most German machine guards are made by the operating plants themselves, and vary widely in design and efficiency. Only limited use is made of automatic feeds for punch presses or other machines. One good principle required by law is the special guarding of grinding wheels which unshielded are a threat to safety.

MACHINING

Magnesium





By ALLEN G. GRAY Consulting Editor, STEEL

Alloys

Special techniques for various machining operations — including turning and boring, shaping, planing, milling, drilling—are recommended by the author

IN TURNING and boring magnesium the general rule is to machine as fast as the tool, fixtures and work will allow. Lathe setups with considerations for more careful chucking of magnesium and slight differences in tool design are similar to those used for brass or steel. It is important in all types of lathe tools that the relief angles be sufficiently large to eliminate rubbing of the tool flanks. Correct values for these angles are shown in Fig. 24.

A wide range of cutting speeds, feeds and depths of cut is possible in turning and boring magnesium. Depths of cut as high as 0.500-in. and feeds from 0.003 to 0.200-in. per revolution are being used commercially. Depth of cut is dependent upon the amount of stock to be removed, but for all practical purposes any cut can be taken, providing the work is of sufficient size and is properly chucked. Heavy feeds provide a very quick means of removing metal but do not give the best surface finish. For good finish, tool feeds should not be over approximately 0.025-in. per revolution.

Extremely fine cuts should be avoided wherever possible inasmuch as they tend to heat work more than do heavier cuts and may lead to increased fire hazards. Cutting speeds for magnesium vary from approximately 150 to 5000 fpm. Selection of cutting speed will depend upon many factors, but in most cases the allowable speed exceeds the maximum speed of the machine tool. Table XV presents general recommendations for determining depths of cut, feeds, and cutting speeds for magnesium.

Shaping and Planing: Inasmuch as the maximum cutting speeds in shaping and planing operations are much lower than regular cutting speeds used in turning and boring, economies in operation are usually effected through use of heavy feeds and depths of cut which are made possible by the low power required to machine magnesium. Cutting fluids are usually unnecessary in shaping and planing operations inasmuch as cutting speeds do not create a fire hazard and only a small amount of heat is developed.

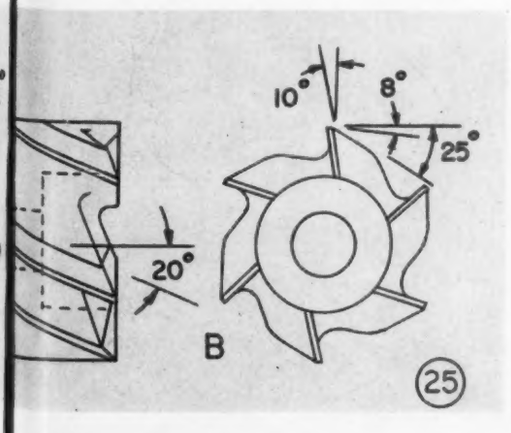
Rigidity of the work piece and clamping fixtures, as well as the possibility of inducing machining stresses in the work, are the limiting factors in the maximum possible size of cut. To prevent marring the surface on finished cuts, the tool block should be lifted on the return stroke of the ram to avoid dragging the tool over the work surface. Practically the same tool designs used for turning and boring can be used for shaping and planing operations. Sharp cutting edges should be maintained on tools, and proper relief angles used.

Milling: Heavy feeds and extremely high speeds can be used to remove metal rapidly with excellent surface finish in the milling of magnesium. High-speed steel can be used satisfactorily on all types of milling cutters but cemented carbides are superior for inserted tool face mills and fly cutters which operate at high speeds. Slab, side cut-

Fig. 23—Drilling operation on magnesium casting

Fig. 24—Typical turning tools for magnesium; (A) Roughing, (B) Finishing. It is important that relief angles be sufficiently large to eliminate rubbing of the tool flanks

Fig. 25—Milling cutters showing approximate tool angles. (A) Coarse tooth milling center, (B) Shell end mill. Negative face rake angles are sometimes used on face mills to throw chips out of cutter



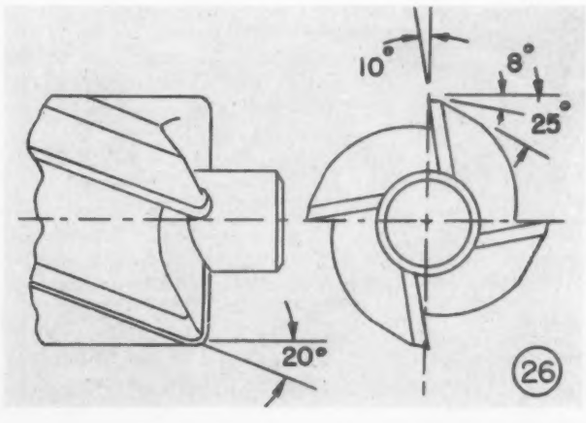
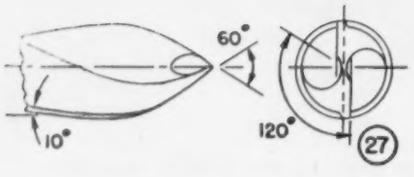
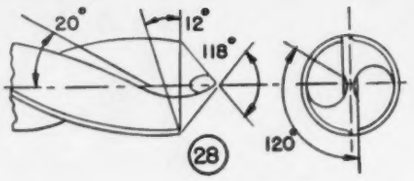


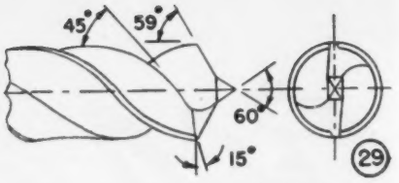
Fig. 26— Typical counterbore for magnesium. Sharp interior corners which cause stress concentration are avoided



DRILL ELEMENT	RECOMMENDATION
Point Angle	60°
Helix Angle	10°
Chisel Edge Angle	120 to 135°
Web	Thinned at point
Corners	Rounded



DRILL ELEMENT	RECOMMENDATION
Point Angle	70 to 118°
Helix Angle	10 to 30°
Chisel Edge Angle	120 to 135°
Relief Angle	12°
Corners	Rounded
Flutes	Polished



DRILL ELEMENT	RECOMMENDATION
Point Angle	118°
Helix Angle	40 to 45°
Chisel Edge Angle	135 to 150°
Web	Constant thickness
Flutes	Open and polished
Point	118° plus spur

Fig. 27—Drill recommended for magnesium sheet. A helix angle of approximately 10 degrees prevents work from climbing the drill on the break-through

Fig. 28—Typical drill for shallow holes. Standard helix angle of approximately 25 degrees is satisfactory but may vary from 10 to 30 degrees as shown here

Fig. 29—Spur point drill with 45 degree helix angle for deep hole drilling

ting, and straddle mills should be coarse-toothed with one-half to one-third as many teeth as in mills for steel. Single and multiple tooth fly cutters have been found to perform exceptionally well on magnesium alloys. Fig. 25 shows the approximate tool angles for various types of milling cutters. Negative face rake angles are sometimes used on face mills to throw chips out of the cutter. Helical slab mills should have a helix angle of approximately 45 degrees.

A wide variety of feeds and depths of cut are possible in milling magnesium. Cutting speeds up to 9000 fpm are being used commercially. In general, the full depth of cut can usually be taken in one pass but for finish cuts the depth should not be less than 0.003 to 0.004-in. Recommended cutting speeds and feeds and depths of cut are given in Table XVI prepared by Dow Chemical Co.

Drillings: Three types of drills will effectively perform all drilling operations for magnesium alloys. These tools include drills for sheet metal, shallow holes (depth less than five times the drill diameter), and deep holes. Ordinary standard steel drills will work satisfactorily for shallow holes, but for maximum production and quality of drilled holes slight modifications of standard drills are desirable for drilling sheet and deep holes.

Sheet drilling of magnesium can be carried out with a sharp, standard 118 degree point angle drill, but for high production of accurate holes with good finish and a minimum burr, a slightly modified drill should be used. The point angle should be reduced to approximately 60 degrees to prevent "walking" of the drill, to reduce thrust, and to prevent abrupt change of thrust when breaking through. The chisel edge angle should be within the range of 120 to 135 degrees. The web should be thinned and the ends of the cutting edges rounded. A thin web at the point helps to center the drill and reduce burrs. A helix angle of approximately 10 degrees will prevent the work from climbing the drill on the break-through. Fig. 27 illustrates a drill recommended for magnesium sheet.

Shallow hole drilling of magnesium, presents few difficulties. The standard helix angle of approximately 25 degrees is satisfactory but may vary from 10 to 30 degrees. Highly polished flutes are recommended to facilitate the flow of chips out of the hole, especially if low helix angle drills are used. Standard point angles of 118 degrees and chisel edge angles of 120 to 135 degrees, which give a relief angle of approximately 12 degrees, will give the best cutting action. Point angles may be reduced to as low as 70 degrees and spur points can be added to eliminate any spiralling in the drilled hole. Rounded corners will give accurately sized holes and better surface finish.

It is important that the cutting edges of drills be kept sharp. Dull drills will give poor surface finish, undersized holes, burrs, and will tend to heat up the work. A typical drill for shallow holes is shown in Fig. 28.

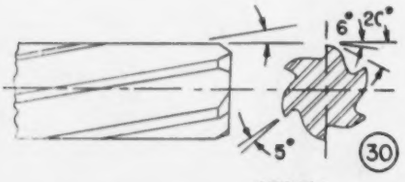
Deep hole drilling of magnesium may be carried out with speed and precision provided certain types of drills are used. Drilling deep holes in magnesium produces an appreciable quantity of chips which must be guided out of the hole

(*Please turn to Page* 111)

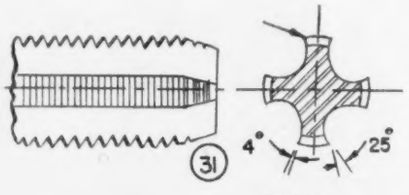
Fig. 30—Reamers under approximately 1 in. in diameter should have four flutes; those over 1 in.— six flutes

Fig. 31—Ground high-speed steel, straight or helical fluted concentric type taps are recommended for magnesium

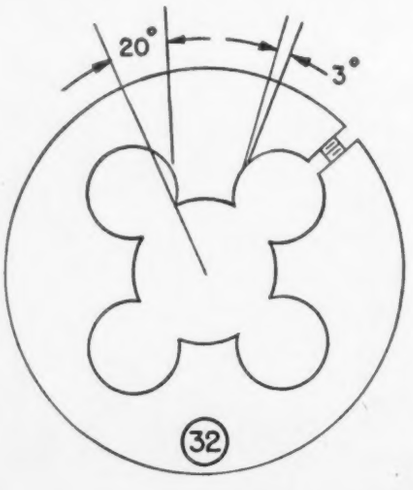
Fig. 32—Threading dies should have about the same cutting angle as taps



REAMER ELEMENT	RECOMMENDATION
Helix Angle	0° (straight) or 10°
Rake Angle	5 to 8°
Relief Angle	4 to 7°
Clearance Angle	15 to 20°
Margin	0.010 to 0.025"
Flutes	4 to 6



TAP ELEMENT	RECOMMENDATION
Rake Angle	10 to 25°
Heel Rake Angle	3 to 5°
Chamfer	2 to 3 threads
Lands	Cylindrical and narrow
Flutes	2 to 4



Engineering News at a Glance

DIVERTING CORROSION: Diversionary force is being employed by Westinghouse engineers to combat the attack of corrosion in water heater tanks, it was learned in Pittsburgh recently. So far, favorable results are obtained experimentally through the simple expendient that ions flow away from the magnesium alloy electrode electrically grounded to the tank. Galvanic currents are such that ions flow away from the magnesium electrode instead of the tank wall, thus destroying the magnesium instead of the zinc. When the electrode is well disintegrated it can be readily replaced. This manner of preserving the interior is along the principle of cathodic protection, long applied to pipe lines and other buried structures subject to galvanic earth currents.

METALLIZED PLYWOOD: Plywood panels metallized with zinc form the electrodes of a special table for testing linemen's rubber blankets at 10,000 v at the Columbus & Southern Ohio Electric Co., Columbus. According to "Metco News," felt pads are used between the electrodes and blanket during the test. Before testing the rubber material the pads are saturated with water, and the felt covered elctrodes are clamped to hold them on the blanket, eliminating voids that might localize electrical stresses in the blanket and tend to burn it. A voltage-regulated transformer, provided with a milliammeter for measuring leakage current, supplies necessary test potential. Voltage starts at zero and is increased to 10,000 v, being held at that point for 3 min.

HEAT OPERATES FAN: In New York, it was learned, L. J. Wing Mfg. Co. is manufacturing unit heaters that use a steam turbine to operate the same fan that delivers the air after it is heated. In the heater, the turbine exhaust passes into the heater section of the unit where it is used to heat the air that the turbine-driven fan delivers through revolving discharge outlets. Condensate, which is never at a higher temperature than 170° F is returned to the boiler through an open return system.

WELDS FLEXIBLE HOSE TO FITTING: Flexible metallic hose now may be welded to a fitting, flange or sleeve by a new method developed by Emil Haegle and Philip Warnock, superintendent and welder respectively in the tube department of Pennsylvania Flexible Metallic Tubing Co., Philadelphia. According to Eugene J. Ronan, executive vice president, the new process assures a pressure-tight, leak-proof union without the use of a coupling. It also provides a lighter assembly. Recent addition to its production of a midget hose—⅛-in. diameter—now enables the company to offer users flexible tubing in sizes ranging from ⅛ to 30 in. diameter. The midget tubing is of bronze, steel and other alloys and is specifically for use as protective casing of capillary tubes utilized in industrial instruments and as a covering for wire and cable.

TESTS AS IT SCRUBS: In Detroit, it was learned, Truscon Laboratories tests the wearing qualities of its chlorinated rubber-base floor covering with a machine that operates at the rate of 26 scrubs per minute, or a total of 12,480 per 8-hour day. The coating is said to be ideal for covering concrete floors, being oil proof, resistant to gasoline and unaffected by most chemicals.

UNGLAZING BOND: A special resin bond used on its latest abrasive wheels will not load or glaze when coming in contact with soft or hardened tool steel shanks of carbide tipped tools, according to Raybestos-Manhattan Inc., Manhattan Rubber Dvision, Passaic, N. J. This feature is reported to eliminate dressing or lapping usually necessary to clean the bond. The wheels, which are being made in grit sizes of 60 to 400, also provide faster and cooler cutting on carbides.

STILL DELIVERS THE GOODS: Good example of the long life of American products in hard service is found in the delivery fleet of the Columbia Box Co. of St. Louis. One of this company's trucks, a model 45 White, is now 27 years old and continues to give good service daily. According to White Motor Co., Cleveland, the hard-tired vehicle became part of the Columbia fleet early in 1920. Today it handles heavy loads of lumber and other materials, and is said to be the oldest truck operating on regular schedule in St. Louis.

WHY STAINLESS: Why is stainless steel stainless? What makes it last for years under corrosive conditions or at high temperatures? The reason, it was learned recently, is hard to believe, but is a scientific fact. Stainless steel is protected against corrosion and heat by a thin, tight "armor" of metallic oxide that is often so thin one cannot see it. This "armor" is not plated on or applied as a coating. It is always present and, if scratched or broken, it repairs itself within 100,000th of a second with a new self-oreated sheath. Under ordinary temperatures the "coating" cannot be seen, being only about 200,000th of an inch thick. With continued exposure to extreme heat, as in high temperature oil stills, the "armor" grows thicker. Then it can be seen—becoming visible as a color over the metal.

MORE COVERING POWER: Because the comparatively new commercial titanium opacified porcelain enamels produce sufficient opacity (white covering power) at 15 to 18 grams per square foot, much interest is being shown in these finishes, according to E. E. Bryant, director of ceramic research, Ferro Enamel Corp., Cleveland. The enamels are mostly of the acid-resisting type which widens the field of possible uses. Good draining qualities of the titanium enamels at 18 to 25 grams per square foot is another attractive attribute.

EASILY-REPAIRED FINISH: If damaged by abuse or careless handling, surfaces covered with a new heat-resistant baking enamel may be refinished easily in the field. The finish, developed by Interchemical Corp., New York, also is capable of withstanding temperatures of more than 500° F without yellowing. The company reports it is easy to apply—sprays at extremely high solids content and bakes to a hard lustrous finish.

MAKES 90-DEGREE CREASES: Plastic items which require right-angle creasing or folding may be turned out at a rapid rate on a machine currently manufactured by Taber Instrument Corp. The North Tonawanda, N. Y., concern reports the development successfully licks buzaboos of under or overcreasing or folding thermoplastic sheeting or rubber, a problem that long harassed many plants. The hand-fed, foot-operated machine forms 90-degree creases with repetitive uniformity on 5-20 ft thermoplastic sheeting up to 30-in. maximum width. Actual crease or fold is formed in the sheet as the heated blade, controlled thermostatically, comes in direct contact with the stock and presses it into the metal die or rubber pad. Use of a metal die as the co-forming medium in the unit enables an inexperienced operator to control creasing within limits considerably closer than previously possible.

Free Machining Die Steel

. . . may be machined in hardened state. At hardness greater than 300 brinell, it is only slightly more difficult to machine than fully annealed steels used for same purpose

PARTICULARLY applicable for plastic molds and for die casting dies for white metal alloys, a steel has been produced that possesses free machining qualities in the hardened state. It is a medium carbon steel having sufficient alloy content to provide air-hardening properties capable of producing a hardness of 275 to 325 brinell in sizes as large as 10 x 20 in. on cooling in still air. Composition is given in Table I. Higher hardness is obtainable from oil quenching, or from pack hardening followed by oil quenching. It is reported that even at a hardness greater than 300 brinell, the steel, called Speed-Cut, is only slightly more difficult to machine than fully annealed steels used for similar purposes.

According to the producer, Vanadium-Alloys Steel Co., Latrobe, Pa., the free machining qualities of the material do not impair the production of high surface finishes on molds or dies made from it. When heat treated according to the manufacturers instructions, it is reported that a high surface hardness for resisting abrasion is provided along with high toughness to eliminate danger of breakage in service. Recommended annealing and tempering temperatures are given in Table II.

Any method of annealing which will insure a protection to the surface from decarburization or carburization and which will permit a sufficiently slow cooling rate to provide minimum hardness is satisfactory. An annealed hardness of about 170 brinell is obtained.

For direct oil hardening it is recommended that the material be heated to a temperature of 1525° to 1650° F, using the low side of this range for small sections and the high side for larger sections. In most sizes this treatment will produce a hardness of 56 rockwell C and it may be then tempered to the desired final hardness in accordance with tempering information given in Table III.

For plastic dies where a surface hardness of 57 to 60 rockwell C is desired, the steel may be carburized by packing in carburizing compound. Since the carbon content of Speed-Cut is higher than that normally used for carburizing plastic dies, it is not necessary that extreme case depths be produced to prevent sinking and to achieve adequate strength. Carburizing cycles of 1 and 2 hours at 1650° to 1700° F will produce case depths of 0.020-in. to 0.045-in. and for most dies it is recommended that the carburizing cycle be maintained at a temperature of 1625° to 1675° F with a carburizing time of 2 hours. It should be quenched directly into oil from the carburizing heat and tempered between 350° and 500° F to produce surface hardness of about 58 rockwell C for these applications. Listed in Table IV are the results of carburizing tests on samples 1 x 1 x 1 in. which were packed in carburizing compound at a series of carburizing temperatures and later tempered.

TABLE I
COMPOSITION

Element	Desired %	Range Limits %
Carbon	.40	.35— .45
Silicon	.30	.20— .40
Manganese	.85	.70—1.00
Sulphur	.00	.03 max.
Phosphorus	.00	.03 max.
Chromium	1.12	1.00—1.25
Molybdenum	.50	.40— .60

TABLE II
HEAT TREATMENT

Temperature for—	
Annealing	1450° to 1550° F
Hardening by Oil Quenching	1525° to 1625° F
Pack Hardening for Oil Quench and High Surface Hardness	1625° to 1675° F

TABLE III
TEMPERING AFTER OIL HARDENING
(Sample Size: 1 x 1 x 1 in.)

Tempering Temp. ° F	Hardness—rockwell "C" Oil Quenched from 1550° F	Oil Quenched from 1650° F
As Quenched	55.5	56.5
200	55.5	56
300	54.5	55
400	54	53.5
500	52	52
600	50	50
700	48	48.5
800	46	46.5
900	44	44.5
1000	42	43

TABLE IV
EFFECT OF CARBURIZATION

Carburizing Temp. ° F	Carburizing Time—Hours	Quenched in	As Quenched Hardness rockwell "C"	Carburized Depth—Inches
1650	2	Oil	60.5	0.032
1700	2	Oil	58.5	0.043
1750	2	Oil	56.5	0.047
1800	2	Oil	54	0.050
1850	2	Oil	52	0.065

Revision of Pipe Thread Standard Published

A revised American standard for pipe threads has been published and is available from American Standards Association. First published in 1919 and revised in 1942, World War II made the need for additional data evident, resulting in the present revision.

This revision provides required information on the subject of pipe threads for any reasonable project requiring some form of thread—taper or straight— from general service to more exacting gaging practice. Standard now includes the fundamentals for the "dryseal pressure-tight joints". The American Standard for Pipe Threads handbook bears the designation B2.1-1945.

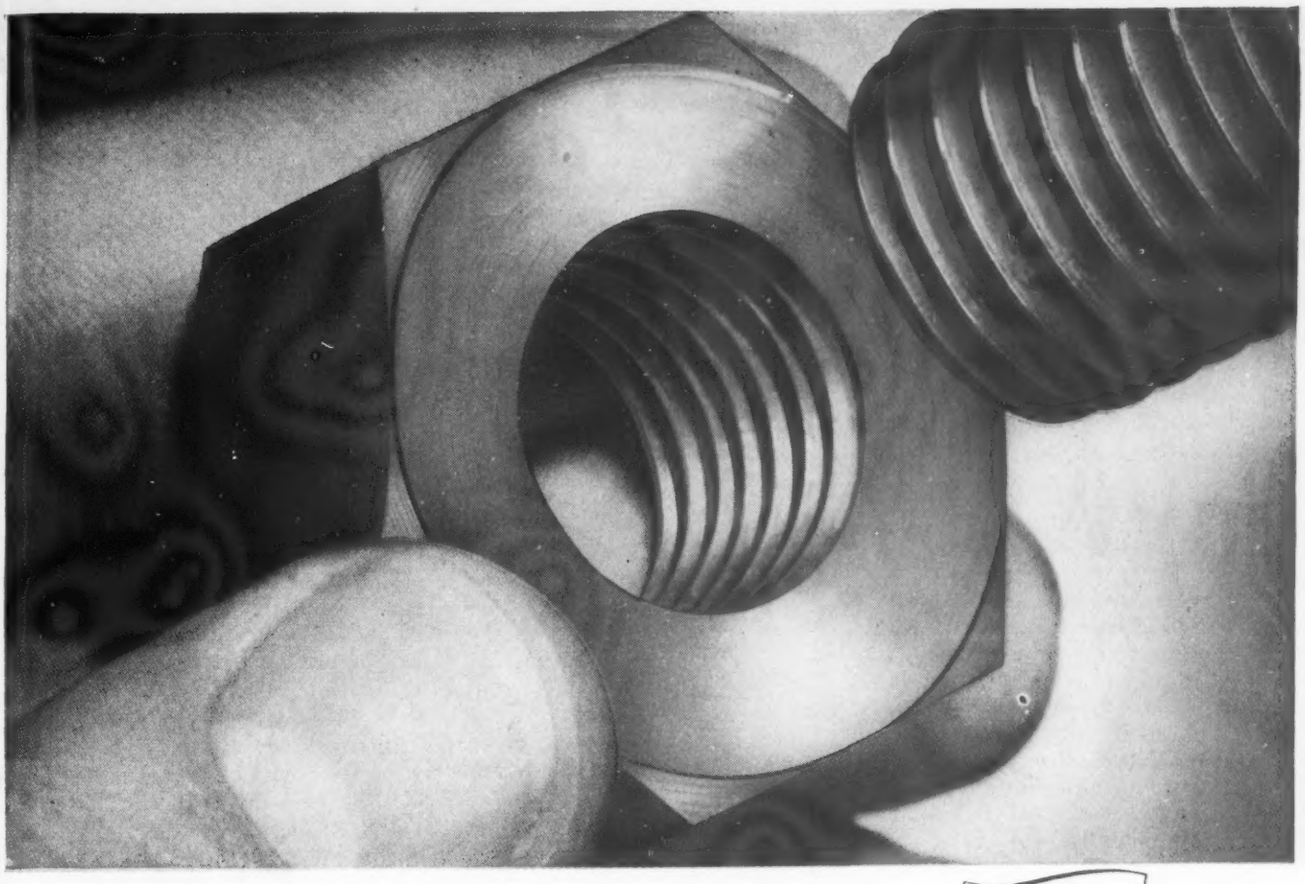
Carbide Tool Catalog Aids in Tool Selection

A new catalog issued by Kennametal Inc., Latrobe, Pa., provides buying information on the company's products and describes and illustrates proper tool selection and application including instructions on methods of use and maintenance that insure optimum performance.

The 56-page catalog, designated as No. 46, contains detailed descriptions of tools that have the company's tungsten-titanium carbide inserts. These tools include various shapes of turning tools, mills, tool blanks, saws, drills, files, rolls, bearings and others.

Steel Mill Lubrication

Centralized lubrication systems as applied to blooming mill operation is the subject of the booklet entitled "Steel Mill Lubrication" issued by Shell Oil Co. Inc., New York. One of the series of booklets in the company's "Facts that Help" series, it summarizes the characteristics a lubricant must possess to lubricate properly all bearings of a blooming mill. It features the operation of the blooming mill because the mill typifies many lubrication requirements of the steel industry.



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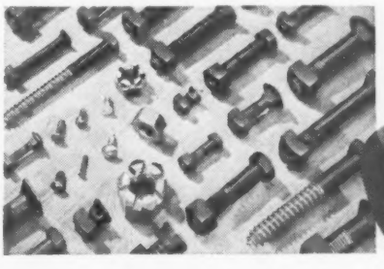

How To Pour BEARINGS

During the course of a survey made by Ryerson, it developed that many plants using babbitt in relatively small quantities were sadly lacking in information that would enable them to pour bearings with assurance of uniformly good results. Here are a few simple rules to follow

By K. T. MACGILL
Manager, Babbitt and Bearings Division
Joseph T. Ryerson & Son Inc.
Chicago

FUNDAMENTAL in the making of good babbitt bearings is the selection of an alloy having the proper physical properties, hardness and compressive strength, freedom from segregation, and good grain structure. Aside from the fact that the selection of such an alloy is necessary in order to secure dependable, long life bearings, the procedure followed in casting is also tremendously important if good bearings are to result. Even the best babbitt can fail in service if a few fundamental pouring rules are not followed.

For every large plant or shop that is completely equipped for pouring bearings, and staffed with skilled maintenance men who have had considerable experience in casting babbitt, there are dozens of other plants that follow no established routine in pouring the relatively few bearings that they are called upon to produce each year. The task may be delegated to an inexperienced workman, or perhaps to anyone in the shop who happens to have time on his hands. Under such circumstances, all too often the results fall considerably short of the near 100 per cent job that could be secured.

There are many ways in which bearings can be poured, with assurance of equally good results. However, experience proved that if the basic principles of heat transfer from molten metal through the bearing shell are observed, good bearings with lining tight against the shell should be obtained, regardless of the particular setup or method that is followed. The average plant or shop usually has or can readily devise the equipment and fixtures that are required. From this point on, it is only necessary to follow a few simple, fundamental rules.

It pays to always use new babbitt, made of virgin metals. When you have decided upon the proper grade for the service involved, do not mix with reclaimed or scrap metal of unknown analysis. While it might appear that reusing old metal is one way to save on bearing costs, it is seldom wise to try to economize by mixing old, used metal with new. Too often dirt or other harmful foreign matter will be included, or metals of unlike analysis may not produce the dense, close-grained structure required to resist wear successfully. If a sizable quantity of old metal is accumulated, this can be used for pouring secondary bearings where loads are light and the performance required is less exacting.

Using a wire brush, clean all equipment, fixtures and the inside of the shell thoroughly. Follow this with a blowtorch and further brushing if necessary. The blowtorch also serves to drive out all moisture from the bearing shell, which is important. The mandrel should be as thin walled as possible, with ends closed with wood plugs to prevent heat loss.

Problem of Shrinkage

Put a waste head on top of the shell. This takes care of the problem of shrinkage as the bearing solidifies, assuring sufficient metal to fill the bearing area completely. The waste head is made of a putty-like substance that is especially prepared for the purpose, and as it does not dry out may be used over and over again. The height of the waste head depends upon the size of the bearing; larger bearings require more excess metal at the top to make up for shrinkage.

Before you start to melt, make sure that you have sufficient babbitt to pour the entire bearing at one time. This is necessary in order to secure a dense and completely uniform structure. The melting pot should be placed close to the work . . . the closer the better. This will prevent heat loss in ladle as the molten metal is transferred from the pot to the bearing fixture.

Follow the manufacturer's recommendation for correct pouring temperature. Generally speaking, a temperature of from 850 to 950° F is sufficient. After the babbitt is completely molten, the best pouring temperature is related to the thickness and size of the bearing being poured. The metal should pour about like water. Heating to a slight excess is not harmful, the only disadvantage being the accumulation of a higher percentage of dross resulting from oxidation.

Thick, heavy bearings can be successfully poured at a lower temperature than bearings that are long and thin. The metal must be hot enough to reach the bottom of the mold and start to build up before any sign of setting occurs. One simple method of checking to determine if the metal has reached the correct pouring temperature is to insert a small, dry pine stick in the pot. It should burst into flame immediately upon contact with the hot babbitt.

Before starting the pouring operation, warm the bearing shell to a temperature of about 200° F. As previously stated, this serves to drive out all moisture and also prevents too quick or nonuniform solidification of the molten metal.

Fill the space completely and as rapidly as possible, continuing pouring until the top of the waste head is reached. Cool the bearing shell by applying water or wet rags, starting at the bottom and working slowly upward. By thus drawing the heat outward, the metal starts to solidify at the inside surface of the shell, adhering tightly to the wall. As the babbitt sets and contracts in this area, the void is filled with hot metal from the mandrel side which in turn is fed from the surplus metal provided by the waste head at the top of the shell. When the metal has completely cooled and set, if the bearing has been properly poured the mandrel should not stick but should free itself from the fixture with little effort.

While conditions and facilities will vary from shop to shop, nevertheless if the foregoing simple, basic rules are followed there is no reason why every bearing produced should not be sound, dependable and capable of giving the long, trouble free service that is expected of it.

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Tools, dies and other wear resisting parts made from Malta cemented carbide and T & V cast nonferrous alloy, made by Jessop Steel Co., Washington, Pa., are described and illustrated in the new catalog issued by the company. Complete specifications including size, tolerances, shapes and grades is included.

SMALLER THAN A *Thumbnail*

PHOTOGRAPH Courtesy Westinghouse Electric Corporation

CHECKING a thread gage smaller than a thumbnail is simple when a Jones & Lamson Optical Comparator is used. The enlarged shadow of the gage projected upon the screen allows its contours to be examined for absolute accuracy, quickly and easily.

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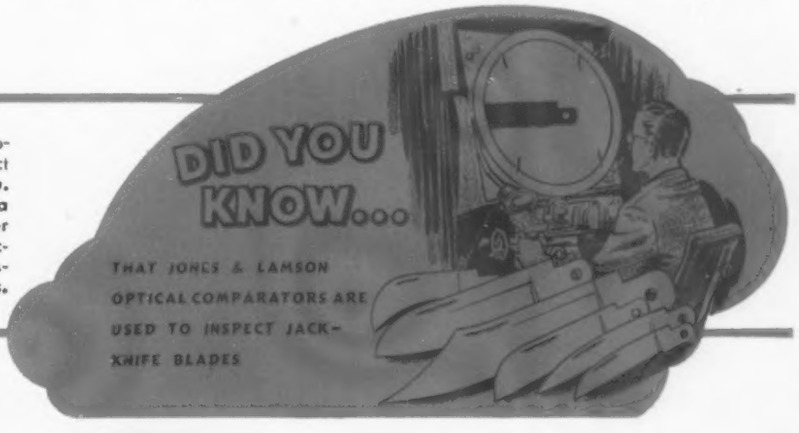

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Plant Freezer

(*Concluded from Page 99*)

Five-inch space was provided between the walls of the box. This was filled with sawdust to minimize heat loss. In Fig. 2, half of the box is removed from a new frozen shaft. The middle bearing already is in place with snap rings inserted, and the men are about to slip over a second bearing.

The four-handled bearing carrier is merely a recessed steel band, bored to the size of the outside diameter of the bearing, and split for easy and fast application to the heated bearing which is held securely in place with a wedge in the swing lock. This proved of great use to the men in leveling off the bearing over each throw before slipping it over on the eccentric.

Entire container is removed in Fig. 3, with the shaft up-ended refrozen. Here the last three bearings are in place, and frost again is beginning to form on the upper end. Fig. 4 shows the two eccentrics with all bearings in place. The one at right is clean, having regained shop temperatures; the other is still heavily coated with frost, two hours after being removed from the container.

Thirty-five hundred pounds of dry ice were used in fitting the bearings, actual freezing time being 24 hours. Not having facilities for checking the temperature of the shafts effectively, it was estimated that about 100° below zero would give a contraction of about 0.020-in. Upon checking the shaft diameters afterwards, it was found the actual reduction was 0.021-in. which, with actual expansion of the bearing over the shaft size, gave a 0.35-in. tolerance.

Experience indicated that about half the dry ice could have been used to do job effectively; also that the somewhat elaborate equipment could have been simplified. At the time, it was felt it was better to be "safe than sorry, inasmuch as this was the first attempt.

Design, Manufacture, Use Of Plastics Molds

Plastics Molds, by Gordon B. Thayer, plastics research engineer, Dow Chemical Co.; cloth, 272 pages, 6 x 9¼ inches; published by Huebner Publications, Cleveland, for $5.

This book is in its third edition, now enlarged and revised, and reportedly is an already accredited standard manual on the subject. It deals with the design, manufacture and use of molds; compression mold types are classified for study and injection molds are presented both as units and broken down into their elements of design and construction. One chapter is devoted to enumeration of 149 practical points in mold design and construction.

Mold sinking by hobbing, milling, the rotary head method, duplicating, along with equipment required are carefully described, as are mold plating with hard chromium and the electroplating process. Finished methods and equipment, including tools, machines and accessories available complete another chapter, while plastic tooling—developed so successfully by Curtiss-Wright Corp.—is described in detail.

The book concludes with a section on estimating plastic molds and another on nomenclature of plastics molding. It is profusely illustrated with photographs and line drawings, besides containing numerous tables and charts.

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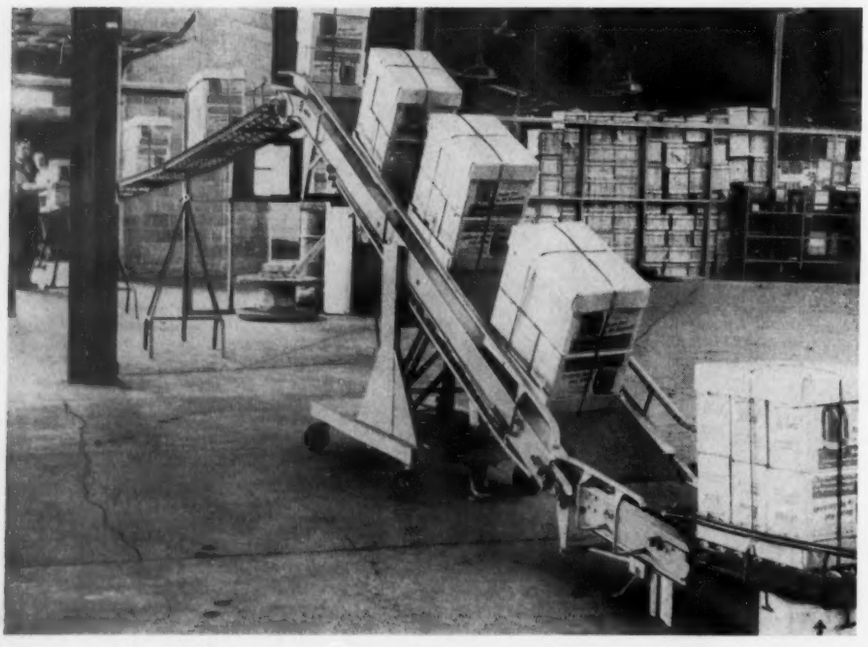
A full color 16 mm motion picture narrated by Lowell Thomas has been prepared by F. J. Stokes Machine Co., Tabor road, Philadelphia 20, telling the story of completely automatic plastic molding. Entitled "Robots at Work," the 30 minute film shows hand molding and manually operated and semiautomatic presses as well as automatic equipment. The company states it will loan prints of the film for engineering and industrial group showings.

Mechanical "Manpower"

. . . loads 600 heaters in 10 minutes



A PORTABLE materials handling installation is receiving much credit for its part in increasing production of small heating units for homes and automobiles in the Indianapolis plant of Stewart-Warner Corp. After packing, the company's South Wind heaters of various types, are placed on the new conveyor line which in turn moves them rapidly to trucks and railroad cars. It is reported that up to 600 heaters can be loaded in 10 min from this conveyor line, using the installation shown here.

Gravity conveyors are utilized for the most part to move the packaged heaters to the shipping department. The strapped packages move on declined sections of gravity conveyor track to a point where a portable conveyor which, like the gravity conveyors, is made by Rapids Standards Co. Inc., Grand Rapids, Mich. These belt conveyors boost the packages to a height necessary to move them by gravity power the remaining distance.

Portability features of the conveyor equipment permit flexibility of lines leading from packaging to shipping as well as saving costly extra handling by additional manpower which would be necessary. With two types of automobile heaters being produced, the Indianapolis plant is manufacturing over 2000 daily.

WHAT MOLYBDENUM DOES FOR STEEL . . .

Wear is of course the great destroyer of gears, cams, and pinions; and wear resistance is one of the cardinal properties of steel to which Molybdenum contributes the most. Whatever the type or size of gear, and whatever the service in which it is used, if it wears out too fast when made of carbon steel, it will last much longer when a carbon-molybdenum steel is adopted. Not mere abrasion alone, but the effects of high temperature need often to be considered, and against these also resistance is very greatly improved by the addition of Molybdenum, either with or without such other alloying elements as nickel and chromium, according to service requirements.

The Molybdenum Corporation, as a supplier of Molybdenum, Tungsten, Boron, and other alloying materials, welcomes opportunity to advise or assist any user.

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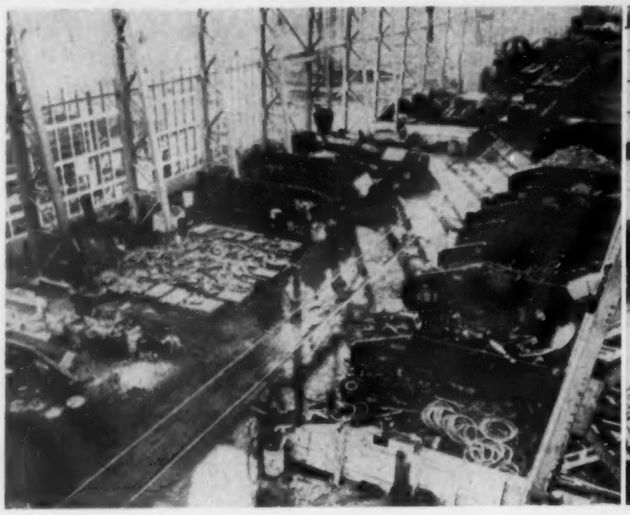

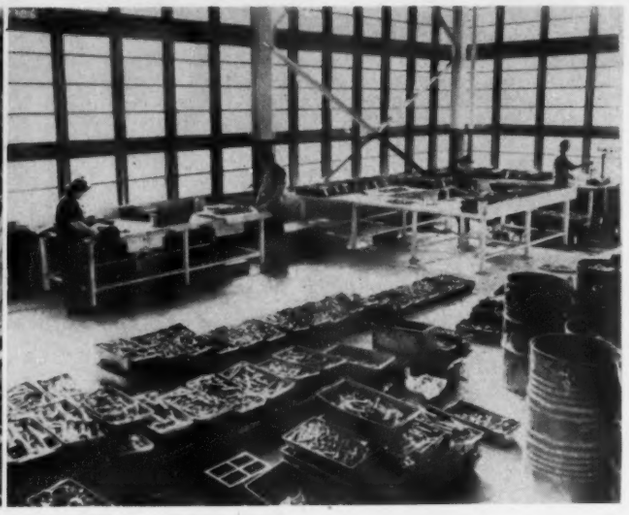

Effective Salvage Program

. . . reclaims 500,000 pieces of hardware per year

GOOD example of how efficient salvaging operations can effect large scale economies is the reclamation program conducted by the salvage department at the Westinghouse Steam Turbine Division at South Philadelphia. The successful organization and operation of the department is based on the company's recognition of the need for adequate facilities and imaginative personnel to do a good job.

Completed in September, 1942, the salvage building has an area of approximately 8000 sq ft and was designed especially for salvage operations. Important features are three automatic rolling doors that will admit large trucks at three points, and crane facilities capable of loading a large trailer in approximately 2 hours. Concrete areas on both sides of the building permit a fork truck to place overflows of material on the outside, giving greater flexibility in reworking materials.

The salvage yard shown left above, with approximately 20 storage bins handles sorting and preparation of metals by shearing or torch cutting. Ferrous metals are loaded into gondola cars with the aid of a 50-ton crane and a railroad siding in the center of the yard. Some 540 cars, or approximately 1-1/4 cars per night, 7 days a week are loaded in a year.

The wood salvaging operation removes nails, spikes, bolts, and damaged ends from all wood, which is then placed on a trailer to be sent to the shipping department to be used again for boxes, car blocking, and various other miscellaneous applications. Approximately 250,000 board ft of lumber per year are made available for re-use.

In hardware section, above right, nuts and bolts ranging from 1/4 to 1-1/2-in. in diameter are salvaged from large equipment like blowers, condensers, turbines, as they are disassembled after testing. This task includes removing scrap, cleaning, sorting, taking out damaged material, oiling, inspecting and placing back in stock. Approximately 500,000 pieces per year are reclaimed in this way, representing a saving of $65,946 in the last 3 years.

Salvage of plate steel by flame cutting usable areas from the scrap plate discarded by the fabricating division, is also found profitable. Upon receipt of this material at the salvage department items that can be used again are piled according to thicknesses, and cut to size on demand. The department is a quick and economical source of flame cut special sizes.

Nine Rust Preventives in New Simplified Line

As a result of evaluation of more than 100 rust preventive formulations developed during the war, E. F. Houghton & Co., Philadelphia, has simplified its rust preventive line. A series of nine products now comprises this line, the company states. Of these, four are of removable thin-film solvent type, one is a nonremovable dielectric variety and four are oil-type films varying in viscosity from thin oil film to a medium grease consistency. This series carries the brand name Cosmoline and is suitable for temporary intraplant protection as well as for shed and outdoor exposure, it is reported.

AISI Hot-Rolled Carbon Steel Bar Manual Revised

Hot-rolled carbon steel bars is the subject of section 8 of the Steel Products Manual published by American Iron and Steel Institute, New York. The recently revised manual contains sections on metallurgical aspects of the bars, manufacturing practices, quality classifications, standard and nonstandard steel, standard practice tables, simplified practice recommendations and marking, packaging and loading methods. An alphabetical index completes the 94-page edition.

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By a turn of a wheel, a bending and punching calculator available gratis from Verson Allsteel Press Co., Chicago, gives the die opening and press capacity required for making 90-degree bends in mild and stainless steel of all commonly used gages. Other side of device indicates tons per hole required to punch holes of eight different sizes in mild steel plate of a variety of gages.

Magnesium Alloys

(*Continued from Page 102*)

through a considerable length of drill flute. High-helix drills (40 to 45 degrees) will do this satisfactorily. Flutes should be opened and polished to provide larger chip spaces and smooth surfaces to aid in chip removal.

The web of the drill should have a constant thickness for its entire length to provide large flutes at the top as well as at the bottom of the drill. Low helix angle drills or drills with unopened flutes may cause chips to jam, resulting in high torques and poor surface finish. Drills of this latter type will have to be withdrawn frequently to clear the flutes, whereas a high-helix drill can penetrate to 25 times the drill diameter in a single pass.

Chisel edge angles of 135 to 150 degrees are essential to provide good surface finish and minimize spiralling in the hole. Angles smaller or larger than those recommended cause difficulties due to improper relief at the cutting edge and the lack of proper centering of the drill. Standard drill point angle of 118 degrees has been found to be the most satisfactory. A spur point drill with a 45 degree helix angle is shown in Fig. 29. The fact that this type drill can be used to drill holes up to 25 times the drill diameter without withdrawing the drill to clear the flutes is of particular importance in the use of multiple spindle or automatic drilling machines.

Speeds used in commercial shops for drilling magnesium are in the range of 75 to 400 fpm, but it is reported that speeds up to 2000 fpm can be used. The feeds used in drilling magnesium should be heavier than those for other metals in order to secure proper chip formation. Small drills work best with light feeds, as they give slightly coiled or ribbon-like chips which feed out through the drill flutes without jamming. Heavier feeds or large drills should be used to prevent jamming of the chips.

Reaming: Reamers for magnesium alloys should have fewer flutes than normal for best results. Reamers under approximately 1 in. in diameter should have four flutes while those over 1 in. in diameter should have six flutes. The flutes may be straight (0 degrees helix angle) or have a negative angle of approximately 10 degrees. Recommendations for the dimensions of reamers for magnesium are shown in Fig. 30.

In reaming, margins should be narrow to minimize springing of the metal and to obtain accurately sized reamed holes. In some cases no margins are used to secure a free cutting reamer. Reaming feeds used for brass and steel will work satisfactorily on magnesium, since a wide range of feeds can be used. A definite cut should be taken with the reamer, otherwise the metal will compress, resulting in an undersized hole with poor surface finish. Approximately 1/32-in. on a diameter should be sufficient stock for reaming holes in magnesium alloys. Heavier cuts may result in chips jamming in the flutes with resultant damage to surface finish and possibly in undersized holes. Cutting speeds commonly used in commercial practice vary from 100 to 400 fpm, with the maximum cutting speeds being established by the maximum speed of the machine tools. High cutting speeds and medium feeds give the best finish and most accurate holes.

Tapping and Threading: Threads which are not held to extremely close tolerances may be tapped in magnesium alloys with standard taps. High production and the close tolerance necessary for class 3 and 4 threads require the use of taps which are designed for use on magnesium. The taps recommended are the ground high-speed steel, straight or helical fluted concentric type shown in Fig. 31. The use of heel rake and the elimination of radial thread relief provide a cutting action on backing out which prevents jamming of the chips and gives a clean, accurately tapped hole. If a tendency for a tap to cut oversize is observed, the rake angle should be decreased; conversely, increasing the rake angle will make a tap cut larger. Dull taps will cut undersize and give poor surface finish.

Cylindrical lands narrower than normal should be used. Two-fluted taps are recommended for holes up to ¼-in. diameter, three flutes for holes from ½ to approximately ¾-in., and four flutes for larger holes. Tapping speeds from 75 to 200 fpm are recommended. The use of a mineral oil cutting fluid such as has already been described will facilitate the tapping of magnesium.

Threading dies should have approximately the same cutting angle as taps. The land should be as narrow as possible to provide adequate chip clearance. A thread die of the type recommended for magnesium is illustrated in Fig. 32. Self-opening dies will give threads with maximum smoothness. The cutting angles of thread chasers should approach those used on turning tools with the exception that the rake angle should be somewhat larger. Particular attention should be paid to the sharpness of the cutting edges and the relief angles. Threads may be chased in magnesium alloys at speeds up to 1000 fpm.

Counterboring: High-speed steel or cemented carbide counterbores for use on magnesium are ground similar to end mills. Margins should be small with adequate relief and clearance angles to eliminate rubbing and to provide adequate chip space. Sharp interior corners which cause stress concentration must be avoided when machining magnesium. For this reason counterbores should have rounded corners at the ends of the cutting edges. Corner radii of 1/16-in. or more are recommended depending on the diameter of the cutter. A typical counterbore recommended for magnesium is shown in Fig. 26.

Sawing: Magnesium is very readily cut with band or circular saws as well as with hand or power hack saws. Due to the low cutting pressures, larger cuts can be taken per tooth than are possible with other metals. This necessitates larger chip spaces to permit the

TABLE XV
RECOMMENDED SPEEDS, FEEDS, AND DEPTHS OF CUT FOR TURNING AND BORING MAGNESIUM

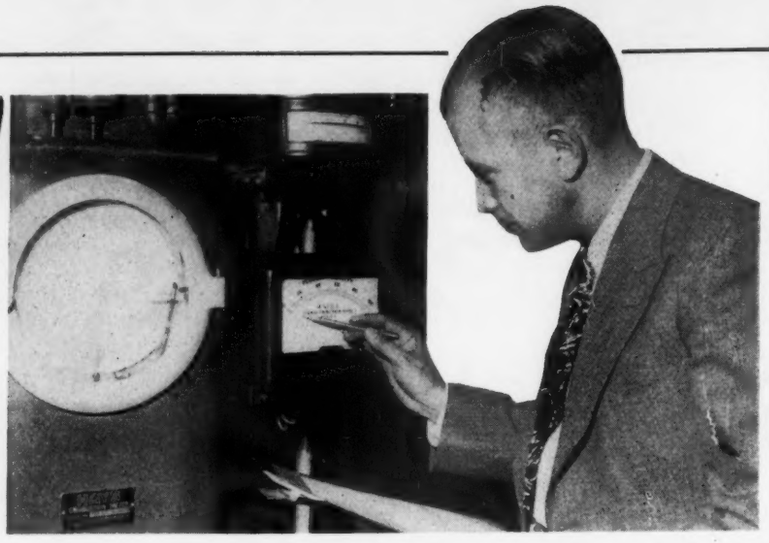
Operation	Speed fpm	Feed ipr	Maximum Depths of Cut inches
Roughing	300 to 600	0.030 to 0.100	0.500
	600 to 1000	0.020 to 0.080	0.400
	1000 to 1500	0.010 to 0.060	0.300
	1500 to 2000	0.010 to 0.040	0.200
	2000 to 5000	0.010 to 0.030	0.150
Finishing	300 to 600	0.005 to 0.025	0.100
	600 to 1000	0.005 to 0.020	0.080
	1000 to 1500	0.003 to 0.015	0.050
	1500 to 2000	0.003 to 0.015	0.050
	2000 to 5000	0.003 to 0.015	0.050

TABLE XVI
RECOMMENDED SPEEDS, FEEDS, AND DEPTHS OF CUT FOR MILLING MAGNESIUM

Operation	Speed fpm	Feed in./min.	Feed in./tooth	Depth of Cut inches
Roughing	Up to 900	10 to 50	0.005 to 0.025	Up to 0.500
	900 to 1500	10 to 60	0.005 to 0.020	Up to 0.375
	1500 to 3000	15 to 75	0.005 to 0.010	Up to 0.200
Finishing	Up to 900	10 to 50	0.005 to 0.015	Up to 0.075
	1000 to 3000	10 to 70	0.004 to 0.008	0.005 to 0.050
	3000 to 5000	10 to 90	0.003 to 0.006	0.003 to 0.030
	5000 to 9000	10 to 120	0.002 to 0.005	0.003 to 0.030

Smoke Control

includes use of electric eye to watch density



Plant engineer checks on percentage of smoke formed in boilers

INDIVIDUAL campaign waged successfully by one large Chicago manufacturer, might be used as a model for other city plants in the war on smoke.

As early as 1923, Ekco Products Co., Chicago, producers of housewares, kitchen tools, and bakers' tinware, took the first step to eliminate smoke. A special clear glass skylight was built into the boiler room ceiling at the direction of the late Edward Katzinger, the company's founder. This enabled furnace attendants to keep constant watch on the smokestack so that action could be taken in regulating draft and fuel.

Later in 1930, a periscope and newly-designed meter registering the percentage density of smoke was added. The periscope permitted the fireman to watch the smoke volume in the flue of the furnace before it even got to the smokestack. The smoke density meter was a double check and provided an accurate numerical method of charting smoke conditions as an aid to control.

Last year a modern electronic smoke control device was installed. An electric eye beam is broken if the smoke becomes even slightly dense and a red warning light goes on to signal the fireman to take corrective action. If the light goes unheeded, an alarm bell automatically sounds to indicate the urgent need for smoke control.

saw to remain free-cutting. Too small a tooth pitch or chip space will cause the saw to ride over the work and rapidly dull the teeth.

Automatic Screw Machine Work: As automatic screw machine stock, magnesium may be machined at higher speeds and feeds than any of the other metals used for this purpose. While the machining characteristics of magnesium permit the use of feeds which average approximately 50 to 75 per cent higher than those used in machining brass, the feeds are limited by the condition of the machine tool, surface finish desired and the size of the work piece. Heavy feeds are preferred for magnesium alloys because they produce well broken chips. Feeds as low as approximately 0.015-in. will produce short coils; below this limit, the feed chips may consist of long coils or ribbons. These long coils break up very easily, however, and do not obstruct the cutting tool or work.

Because of the close tolerances required in screw machine work and the necessity of maintaining such tolerances over a considerable period of time, the use of a cutting fluid is recommended on certain jobs regardless of the cutting speeds. Primary purpose of the cutting fluid on screw machines is to control thermal expansion. On simple work at low cutting speeds, it may be possible to eliminate the cutting fluid since only small quantities of heat will be generated; but on the majority of jobs, the use of a cutting fluid is recommended. Tools should not be allowed to rub on the work inasmuch as this will greatly increase the amount of heat generated.

High-speed steel tools will work satisfactorily, but the more abrasion-resistant carbide tools will give much longer life. The higher initial cost of the carbide will usually be more than offset by the savings effected through less down time due to fewer tool resettings. Screw-machine cutting tools must be kept sharp with smooth cutting surfaces and ample relief angles.

Screw machine tools for cutting magnesium require little change from standard brass cutting tools. Special attention must be paid to relief and clearance angles and to chip spaces, but in general, special tools are not necessary.

(*Continued in later issue*)

Offers Extruded Rounds In Two Carbide Grades

Developed primarily for use as wear-resistant elements and suitable for such applications as guides, feeding fingers, rollers, scribers, and thread checking wires, a line of extruded rounds is being made in two straight tungsten carbide grades by Kennametal Inc. of Latrobe, Pa. Designated as KE5 and KE7, rounds have a rockwell hardness of 89 and 91. They are offered in either rough extruded or centerless ground in diameters from 1/32 to 1/4-in., in 1/32-in. steps. Standard lengths are in even inches from 1 to 10 in. Other extruded forms, such as flats, tubes, triangles, squares and ovals, may be obtained upon special order.

Humidity Detecting Ink

A liquid which may be painted, sprayed or printed on paper, cloth, metal or similar surfaces is said to determine humidity changes, leaks or excessive moisture in or on containers made of any of these materials. Called HygroInk by its maker, Eljay Enterprises, Newark. N. J., the liquid, after drying, changes from blue-green to pink as the humidity increases. As humidity decreases, the color returns to the original blue-green.

—o—

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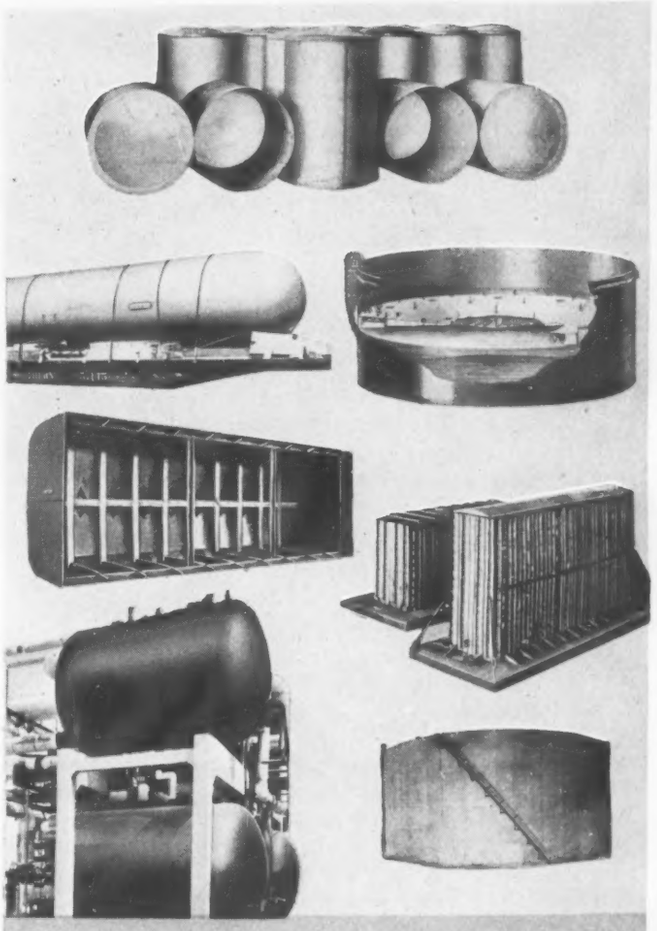

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By H. E. REINHOLD
Sheet and Tin Mill Division
Carnegie-Illinois Steel Corp.
Gary, Ind.

ORE DOCK *Unloading Capacity*

. . . increased by installing rectifier stations under ore piles

SOON after the beginning of World War II blast furnace operations at the Gary Works of the Carnegie-Illinois Steel Corp. were stepped up to capacity. This necessitated an increase in capacity of the unloading facilities at the ore dock. As a result, the supply of 250-v dc power to the unloaders also had to be increased.

Several technical details were involved in the solution of the problem. The first, and simplest, was the selection of equipment for converting the available 6600-v, 3-phase, 25 cycle ac power into the required 250-v dc power. Mercury arc rectifiers were selected for this task. The second problem was how to hold line voltage loss to a minimum. This was solved by installing the rectifiers in two massive concrete vaults below the ore yard and closely adjoining the unloader trolley rails at approximately third points as shown in Fig. 4.

These rooms, which are approximately 25 ft wide by 71 ft long with a maximum ceiling height of 19 ft, are built parallel with the unloader tracks and connect on their south ends to tunnels which run under the ore bridges and stock piles, extending back to the blast furnace. Ample space is provided in each room to house the rectifiers, transformers, high-voltage switchgear, and the required low-voltage distribution switchgear and

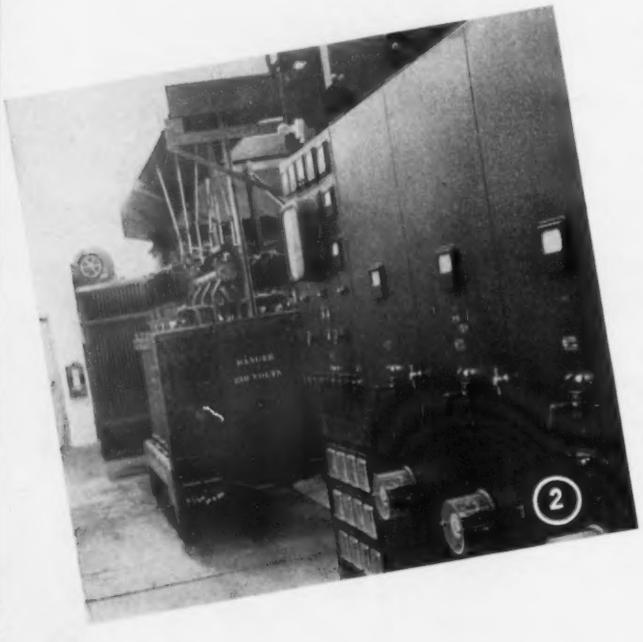
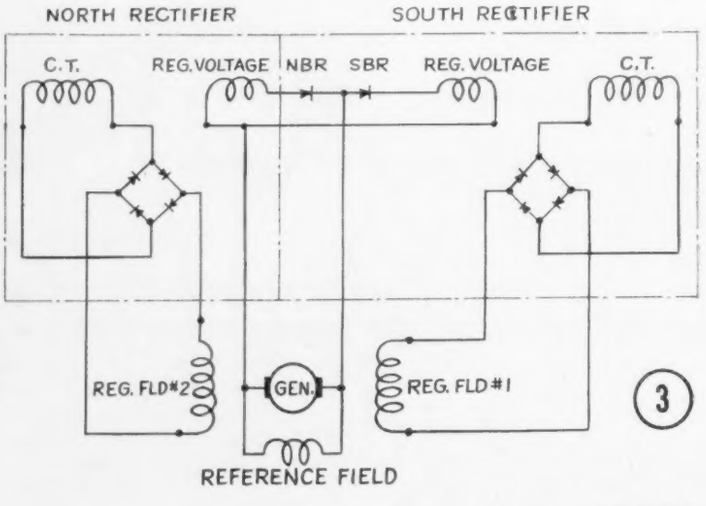


Fig. 1—General view of ore yard, Carnegie-Illinois Steel Corp., Gary, Ind.
Fig. 2—Interior of one of the rectifier rooms
Fig. 3—Voltage regulating circuit



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Stress-relieving furnace at Birmingham, Ala., 13 ft. 2 in. wide, 80 ft. long and 16 ft. 1 in. from car floor to crown of arch.

Stress-relieving furnace at Greenville, Pa., 15 ft. 2 in. wide, 65 ft. long and 18 ft. 2 in. from car floor to crown of arch.

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Stress-relieving furnace at Chicago, Ill., 15 ft. 2 in. wide, 85 ft. long and 18 ft. 2 in. from car floor to crown of arch.

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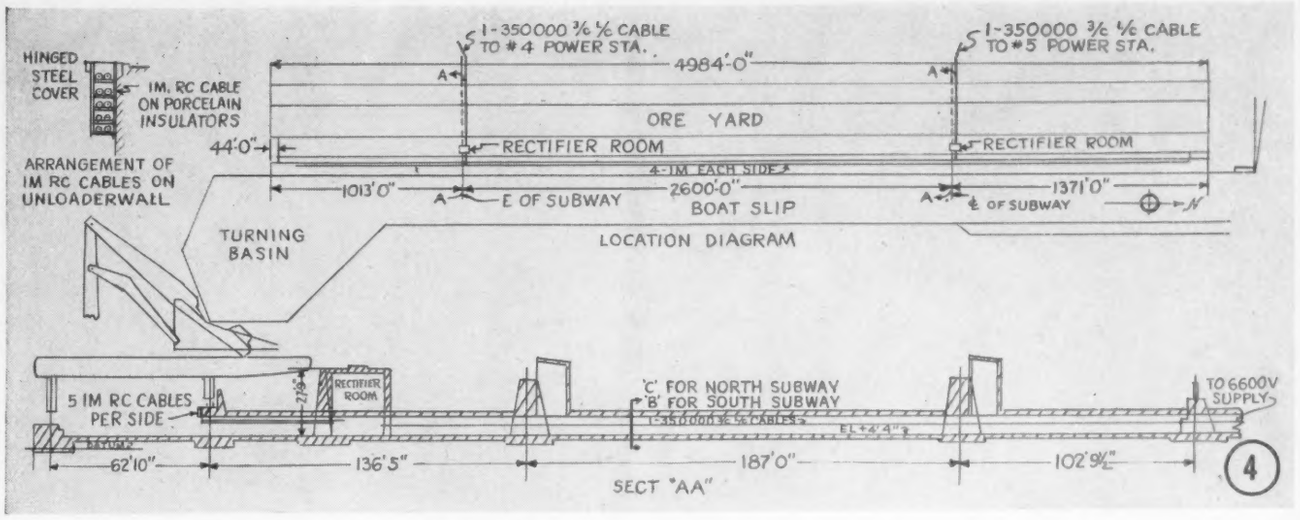

Fig. 4—Direct current conversion feeder system showing the location of the feeder rooms

buss structure without crowding. Each room is provided with a water-cooled air conditioning and ventilating unit drawing air from the entrance tunnel. Exhaust air discharges through a short subway vent opening under the west side of the unloader tracks.

Fig. 2 shows the interior of one of the rectifier rooms. The first three panels at the right are low-voltage distribution units, the next carries the rectifier voltage regulator, meters, relays and control switches. The rectifier and its auxiliaries appear in the center of the picture, with the transformer in the background. The high-voltage switchgear is to the left of the transformer, which conceals it in the illustration. The rectifiers are each of 1000 kw capacity, and are 6-tank, single anode, grid controlled, water-cooled units.

Both rectifier stations receive 6600-v ac power from station No. 3 over 3-phase, lead-covered cables and are also connected with the power station by signal pilot lines. These are so arranged as to operate both visible and audible signals at the power station switchboard in case of a rectifier failure of any sort, thereby permitting rectifier operation without attendants in the rectifier rooms. Daily inspection of the rectifier rooms and their equipment has been found sufficient to keep these stations in good operating condition.

Load conditions under which the rectifiers operate are severe, with maximum 15 min demands of 145 per cent and momentary peaks of 175 per cent. Extreme electrical loading develops when all load is concentrated either at the extreme north end of the dock or at the extreme south end of the dock. The ideal condition occurs when unloading operations take place midway between the two rectifier stations. It was originally thought that the load could be distributed between the rectifiers by impressing voltage drops across given lengths of trolley rail upon the voltage coils of the voltage regulators associated with the rectifiers.

When the concentration occurred at the mid point, the load distribution system worked well, but this condition rarely occurred in practice. If, however, an ore boat docked at either end of the slip and all five unloaders went into operation, it was found that the nearest rectifier would attempt to take all the load.

To meet this condition a new circuit, Fig. 3, was devised to maintain 230 v at the unloaders, regardless of their position, and tends to distribute the load evenly between the rectifiers. Current transformers were installed at each of the rectifier stations to interpret load changes. These transformers are connected to full wave rectifiers, whose direct current output in each case is connected to the auxiliary control field windings of a specially designed generator of a motor-generator set installed in the south rectifier room. In addition to these two regulating windings, a third winding provides a reference field, being directly connected across the generator armature. The output leads from this special generator are connected to the potential coils of the rectifier voltage regulator through two selenium blocking rectifiers designated N.B.R. and S.B.R. in Fig. 3.

Polarity relations of these auxiliary fields and blocking rectifiers are established in such a manner that when load is concentrated at the extreme south end of the slip a base pressure of 250 v at full load is maintained on the south rectifier. The north rectifier is, at the same time, permitted to assume a pusher pressure of 275 v, which results in its assuming two-thirds of full load. If the load is at the north end, conditions are reversed. As a consequence, the unloader motors are at all times supplied with the necessary 230-v current, regardless of whether the maximum load develops midway between the two rectifier stations or at either end of the slip.

Both rectifier stations are provided with supplementary 250-v dc power feeders from their main power stations so that in case a rectifier must be removed from service for any reason its load may be assumed by the main station without interfering with the operation of the unloaders. Load dispatchers are kept advised of rectifier operations by means of ammeters on their desks. These are connected to current transformers installed on the high-voltage lines running from the main plant power stations to the ore yard rectifier rooms.

Water Conditioning Data Described in Bulletin

Advanced and modern methods and apparatus for conditioning water and other liquids are described in the 60-page bulletin published by Liquid Conditioning Corp., New York. Different types of water conditioning processes are covered and the applications, advantages and limitations of each type.

Included are tables listing various kinds of gaseous and solid impurities, showing effects, limits of tolerance for various purposes, methods of removal and residual amount of each impurity after treatment. Illustrations show diagrammatically principles of construction and operation of various processes and equipment for softening, clarification and demineralizing of water and other liquids.

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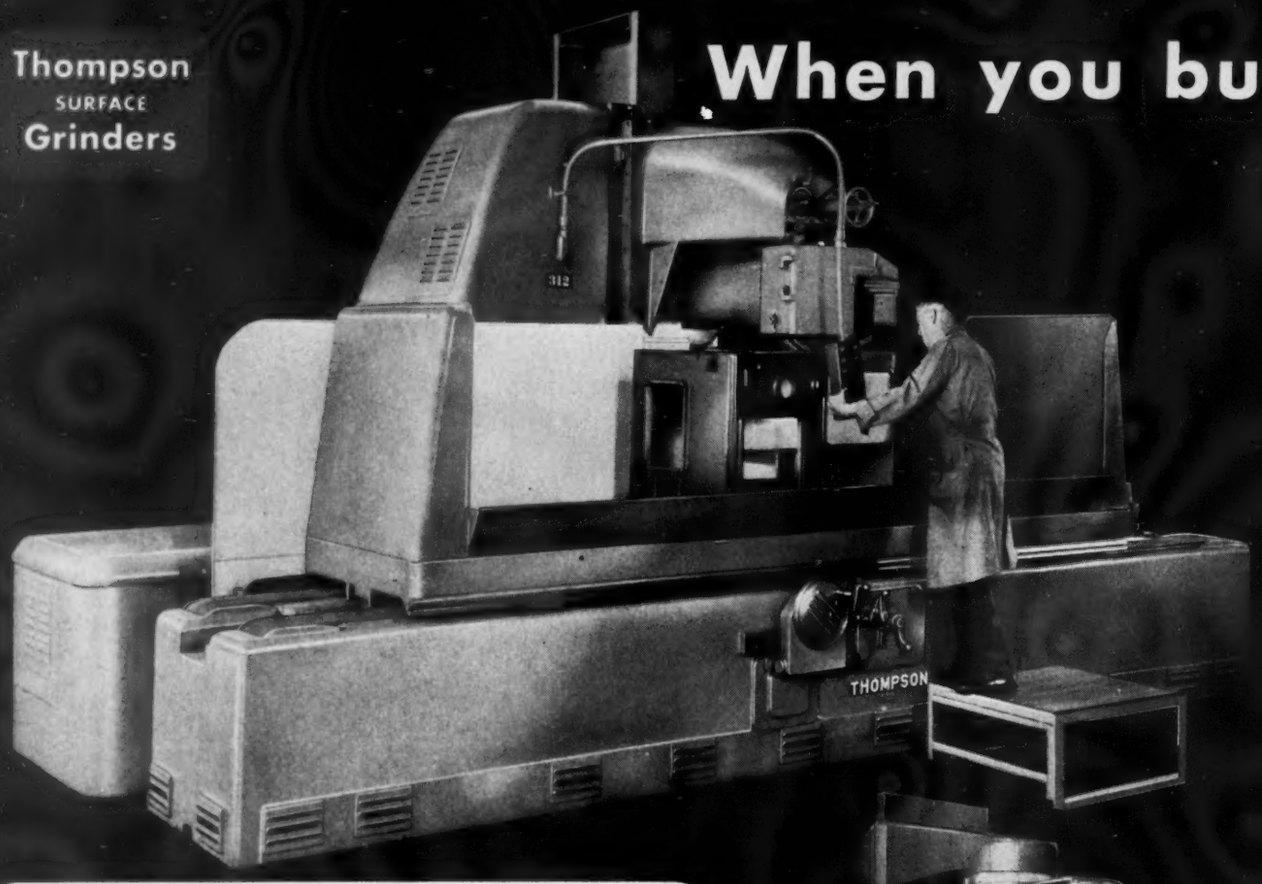

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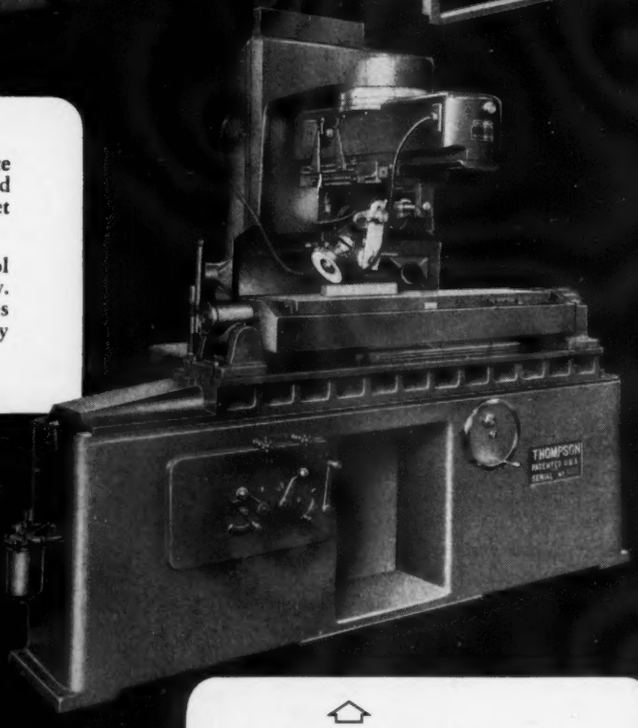

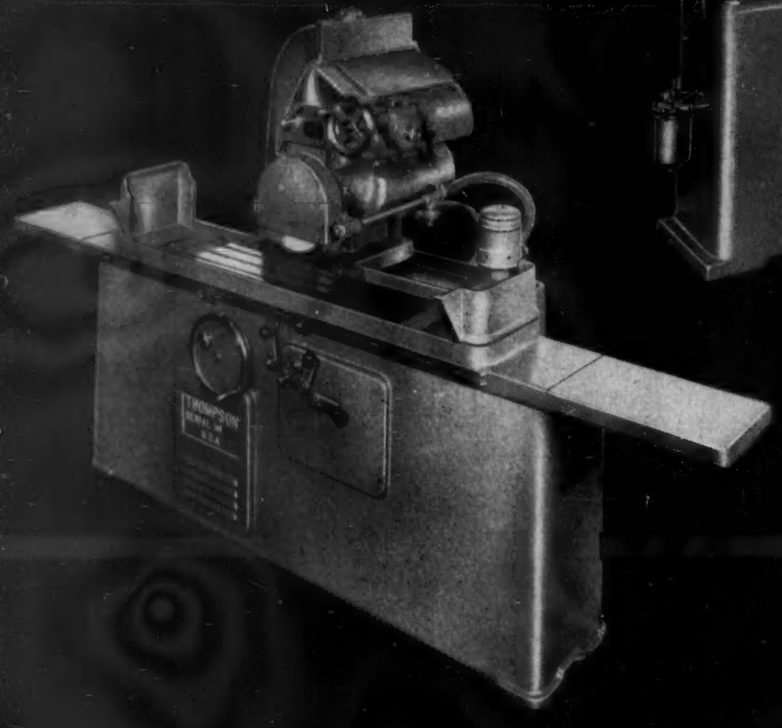

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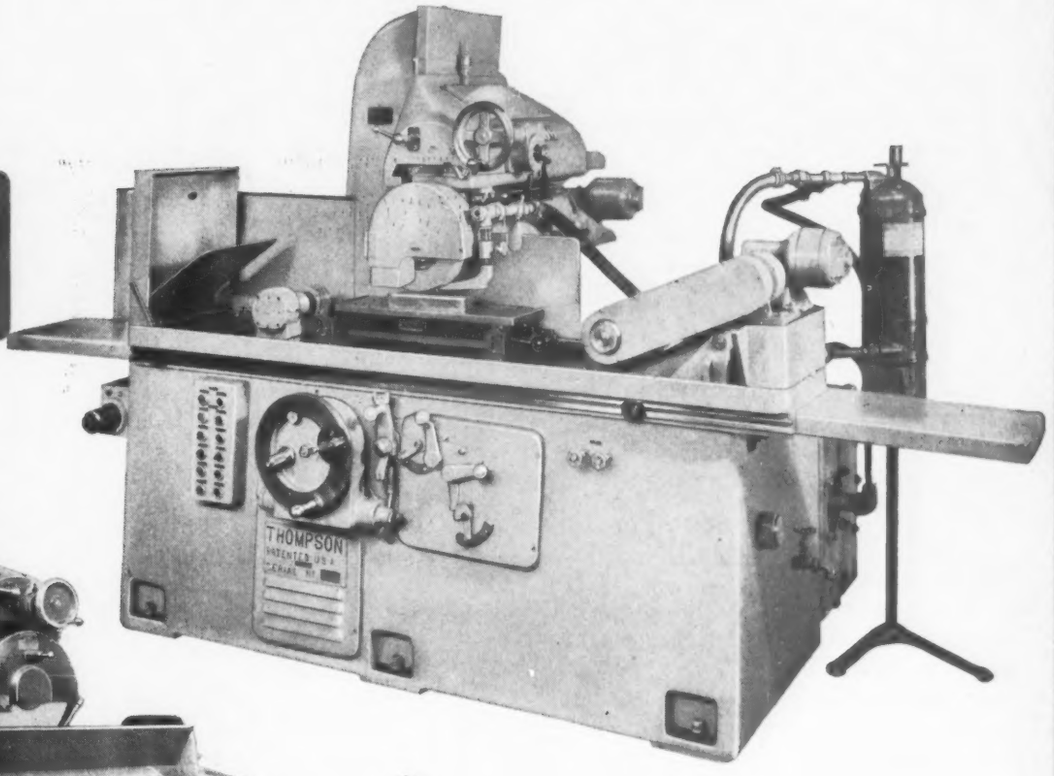

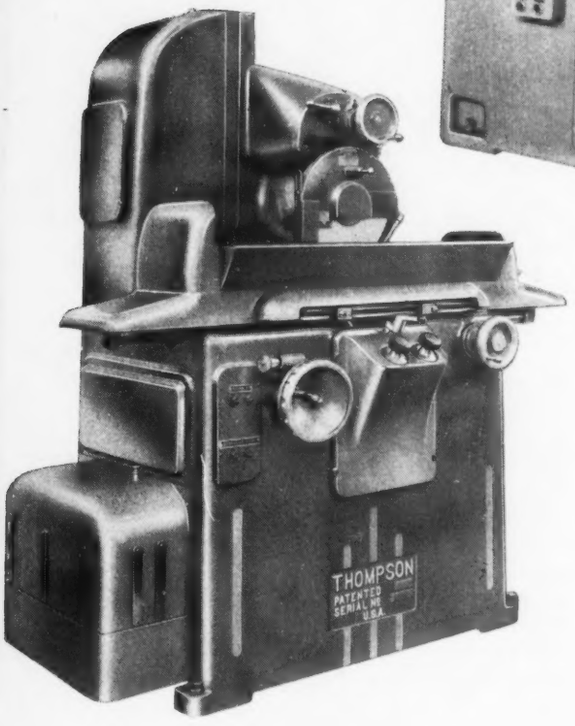

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High Temperature Protection

(*Continued from Page* 93)

appearance, adherence and ease of application. The mill batches for the coatings (A-19, A-20 and A-55m) are given in Table I. The fourth coating, A-31, consisted of a thin application of A-20 over a ground coat of A-19. Details regarding the milling, application and firing of the coatings are given in reference 1.

Table II gives the coefficient of linear expansion per degrees centigrade over the range 25° to 400° C and also the interferometer softening temperature of frit No. 11 and of three coatings.

The thermal expansion is higher for the new coatings than for many ground-coat enamels. Experience has shown, however, that these new coatings should not be applied in as great a thickness as conventional ground-coat enamels because of a tendency of thick applications toward spontaneous chipping a defect which ordinarily indicates an excessively high residual stress between the coating and metal base. This higher residual stress in the ceramic coatings may be caused by the higher softening temperatures, resulting in a wider temperature range over which stress is introduced into the ceramic coatings during cooling.

All of the mat coatings prepared with A-1 alumina were somewhat porous and it is believed that this porosity is responsible for the absence of reboil blisters when coated specimens are heated through the range 1050° to 1150° F. The reboil gases are apparently able to pass through these porous coatings without blistering while the imperviousness of the dense glossy types is such as to prevent the escape of these same gases without formation of blisters.

Laboratory Tests: Numerous laboratory tests were made on the coatings developed at the National Bureau of Standards as well as on conventional type coatings submitted for trial by a number of manufacturers. The laboratory test conditions were chosen to simulate operating conditions in airplane exhaust systems, especially stacks and collector rings of some motors without turbo-superchargers, and included the following: (a) Flame-impingement test, (b) three types of thermal shock test (two very severe), (c) test for protection of metal against oxidation and (d) test for the protection of metal against changes in properties caused by heating. The flame-impingement and thermal shock tests caused cracks in varying degrees in all the conventional coatings and also produced reboiling in these coatings during the heating. The cracks occurred in patterns suggesting strain lines, and the reboiling tended to follow the cracks, but also occured in random distribution where there were no cracks. Neither defect occurred in the NBS ceramic coatings A-19 or A-31.

TABLE I

Mill batches used in the preparation of ceramic coatings A-19, A-20 and A-55m.

Ingredient	Parts by Weight A-19	A-20	A-55m
Frit 1[1]	50.0	...	...
Frit 11	50.0	100.0	100.0
Calcined alumina[2]	25.0	20.0	15.0
Enameler's clay	10.0	6.0	15.0
Black cobalt oxide	1.00[3]	0.25[3]	0.50[3]
Citric acid crystals	0.05	0.05	0.03
Water	50.0	50.0	50.0

[1]The ratio of the soft frit (No. 1) to the hard frit (No. 11) may be varied in either direction when resulting slip is better suited to local plant conditions. Compositions of frits 1 and 11 and detailed instructions for application may be found in reference (1).

[2]Aluminum Ore Co., A-1.

[3]This amount of cobalt oxide may be reduced or even eliminated without damage to performance characteristics. Nearly black color imparted by the cobalt is conducive to uniformity of appearance.

TABLE II

Coefficient of Linear Expansion and Interferometer Softening Temperatures of Frit No. 11 and Three Coatings.

Material	Expansivity 25°—400° C	Interferometer Softening Temperature	
Frit 11	9.6×10^{-6}	531° C	988° F
Coating A-55m	9.6	560	1040
Coating A-19	10.2	589	1092
Coating A-20	10.3	592	1098

The coatings which showed the least reboil gave the best protection to the metal against oxidation, and also proved most effective in preventing loss in strength and the development of embrittlement.

Service Tests: A considerable number of exhaust stacks, coated at the National Bureau of Standards, were attached to motors and tested by the Philadelphia Naval Air Experiment Station, and Norfolk Naval Air Station, the Army Air Technical Service Command at Wright Field, Bell Aircraft Corp., Glenn L. Martin Co. and the Wright Aeronautical Corp. Collector-type exhaust systems were tested by or under supervision of the Army Ordnance Tank Automotive Center, the Navy Department Bureau of Aeronautics, Aeronca Aircraft Corp. and Grumman Aircraft Engineering Corp.

One of the first sets of exhaust stacks to be tested is illustrated in Fig. 3 which shows condition after 178 hours of operation on a 1350 hp motor at the Naval Air Experiment Station in Philadelphia. Coating A-31 shows no effect from the treatment, while coatings C-9, C-1 and C-8 (all glossy ground coats) are damaged in varying degrees.

Two types of defects are present on the damaged stacks. One is a series of cracks following a design apparently corresponding to the strain lines caused by temperature gradients. The second defect consists of reboil blisters, which broke and exposed the metal beneath. Such blisters have a tendency to segregate along the cracks. In areas where no cracks are formed they show no definite pattern. These defects closely resemble those found in the laboratory tests; in fact, there was excellent correlation between the several service tests and the laboratory tests.

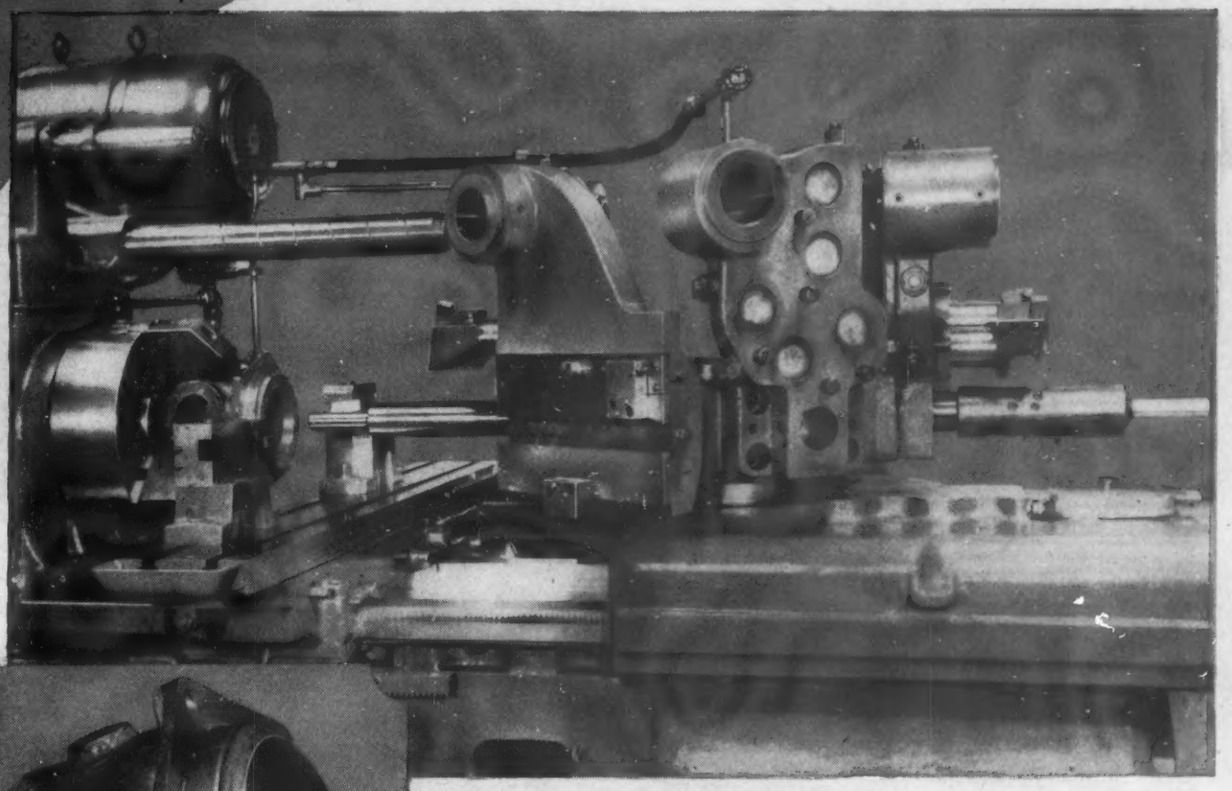
Fig. 4 shows two stacks after 300 flying hours on a Martin PBM-3D patrol bomber operating out of Norfolk, Va. The A-31 stack on the left is not visibly affected by the treatment, while the stack on the right coated with C-1 shows numerous broken blisters and serious rusting.

All the other service tests also showed the newly developed coatings to be superior to the conventional glossy coatings. In no case did the A-19 or A-31 coatings develop visible cracks or reboiling. Because A-19 is applied in one coat, while A-31 requires two, A-19 was recommended for exhaust stack applications. Where metal temperatures of 1250° F or slightly above are encountered, A-31 is recommended.

Sections from two of a series of coated collector rings tested under the supervision of the tank automotive center of the Army Service Forces are shown in Fig. 2. These collectors were attached to M-4 tank motors during dynamometer tests. The part on the left was coated with A-31 and had undergone 120 hours of operation. The other coating, which was one of the poorest, was a proprietary product of the glossy type and had been under test for 13.5 hours, or only about one-tenth as long as the specimen coated with A-31.

Proving ground tests were also made on ten collector rings, each of which was protected with a different coating. One of these collector rings was coated with A-19 at the National Bureau of Standards and the others were coated by seven enamel frit manufacturers to whom the uncoated collector rings had been submitted by the tank automotive center for application of coatings recommended by these manufacturers. After approximately 2500 miles of operation on M-4 tanks, only the NBS ceramic coating received an "excellent" rating. The others all showed damage, most of which consisted of thermal cracks and blisters.

Production of Coated Exhaust Parts: Commercial production of low carbon steel exhaust stacks with NBS ceramic coating A-19 was started in 1944. By the end of the war three enameling companies had applied the coating to substantial quantities of aircraft exhaust stacks. Since the shortage of stainless steel never became acute enough to limit its use in aircraft, the A-19 coating on low carbon steel was used through pref-



Machining operations on this Bevel Gear Case are simplified . . . . . by Special tooling on a . . .

P & J 5DLX Automatic

Ability to chuck irregularly shaped work and tool up for convenient and fast sequence of machining operations with P & J Automatics are exemplified here. The part—a grey iron bevel gear case—is required on a quantity production basis and in spite of its shape, the job must be handled with a minimum of floor-to-floor time. The actual production figures—available on request—disclose high machine output and reflect the outstanding advantages which accrue through the tooling possibilities available on P & J machines.

In cases where production needs warrant it, P & J is prepared to furnish two spindle machines for work now being performed on single spindles. Two-spindle P & J Automatics are available for double set-up in three sizes.

Ask P & J engineers to study your needs and offer recommendations for meeting them at lowest cost per piece.

DETAILS OF JOB . . .

Procedure:

Presenting closed end to spindle, grip on body at 3-13/16" radius with 2 jaws and on flat with 1 jaw.

Machine as follows:

1st T.F.—Rough bore 4.626" dia.; face flange; rough turn and bevel 7.500" dia.; face end at 6⅝" dia.

2nd T.F.—Finish the above; bevel 1/16" x 45° at bore.

3rd T.F.—Blank

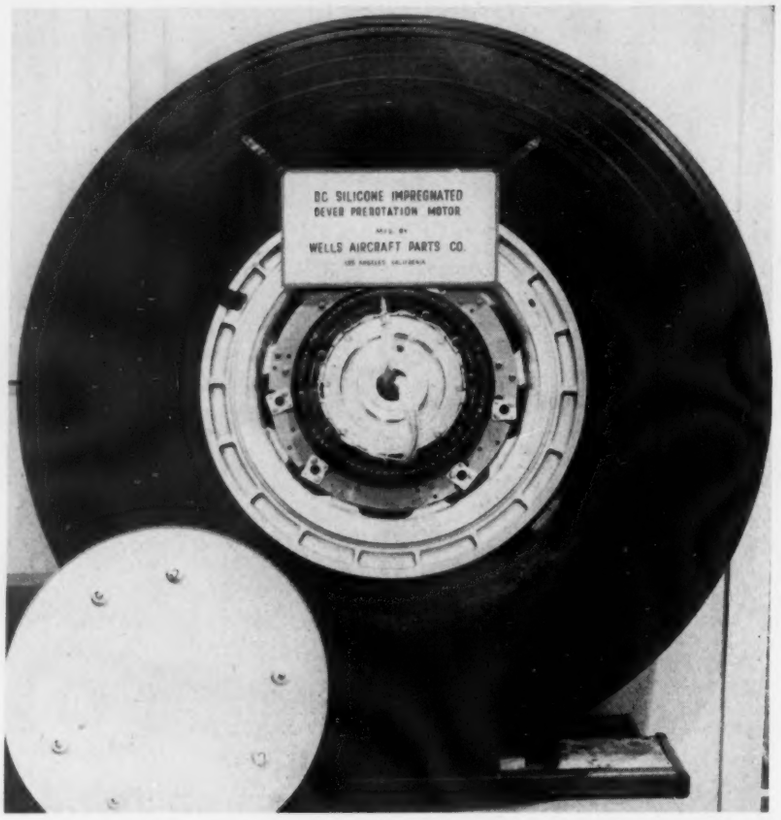
4th T.F.—Blank

5th T.F.—Size turn 7.500" dia.

6th T.F.—Size bore 4.626" dia.

POTTER & JOHNSTON MACHINE CO.

Pawtucket, Rhode Island



SILICONE INSULATED: Exhibited at the Electrical Engineering Exposition in New York, Jan. 27 to 31, this prerotation motor for aircraft wheels is silicone insulated to meet rigid aircraft performance specifications. The prerotation motor for the Lockheed Constitution is only 1¼-in. thick and 10 in. across the air gap inside the armature. Designed by Otto E. Dever and made by Wells Aircraft Parts Co., Los Angeles, these small motors must rotate a wheel weighing 295 lb at 630 rpm for 5 min per landing. Photo courtesy Dow Corning Corp.

erence rather than through an enforced substitution.

Another application of the A-19 coating which reached the production stage before the end of the war was the coating of tail pipes for the exhaust systems of the amphibious truck or "DUC". One section of this pipe was 9 ft long by 1 3/4-in. ID, with S shaped curves at each end. Two other sections were approximately 3 and 2 ft long, respectively, with 2 1/2-in. ID. It is considered significant that the coating could be applied satisfactorily to such complex shapes.

Potential Uses of Coatings: In addition to the use of the new coatings for the protection of low carbon steel in various military exhaust systems, there are a number of other possible applications where the new coatings, or modifications thereof, might be beneficial in prolonging the life of steel parts which are subjected to relatively severe temperature conditions. A list of such potential applications would include the following: (1) Domestic stove parts such as grates or burners, (2) industrial furnace parts, such as muffles, dampers or burners, (3) parts for heat interchangers, (4) heat baffles for continuous enameling furnaces, (5) annealing boxes, and (6) mufflers and tail pipes for buses, trucks and automobiles.

The development of the new type of coating through the stages of laboratory study, service tests and regular production was made possible by the co-operation of several agencies. The Navy Bureau of Aeronautics, Army Air Forces and Army Ordnance Department participated in the service testing of the new coatings in parallel with conventional types submitted by manufacturers.

Several of the latter, and the Porcelain Enamel Institute, were instrumental in promoting the use of porcelain enameled exhaust systems and participated in arrangements for some of the comparative tests, especially by the tank automotive center. In addition, a number of aircraft companies co-operated by making extensive tests of the new National Bureau of Standards coatings in direct comparison with conventional porcelain enamels.

REFERENCE

1. The author's Ceramic coatings for high-temperature protection of steel, J. Research NBS Vol. 38, March, 1947.

Bulletin Describes New Bronze Electrode

A series of five heavy coated, shielded-arc aluminum bronze electrodes known as Ampco-Trode AC are described in a bulletin issued by the manufacturer, Ampco Metal Inc., Milwaukee. According to the booklet, the electrodes, designated as W-9, are the first usuable alternating-direct current shielded arc electrodes ever developed for use with the metallic arc process.

Included in the booklet are illustrations, a table of physical properties and a list of 57 typical applications. Detailed welding procedures also are included.

Cutting Material Analyzed

Comparative fields of usefulness of high speed steel, cast alloys and carbides as cutting tools are analyzed impartially in a recent booklet published by Allegheny-Ludlum Steel Corp., Pittsburgh, entitled, "Cutting Tool Materials." The brochure points out that growth and development of modern industry are closely related to cutting tools which play a vital part in the machining of all kinds of engineering materials.

Objective of the booklet is to correlate comparatively basic characteristics, properties and functions of the three broad types of cutting materials so their usefulness for specific requirements may be evaluated.

Hardening Booklet

Brief resume of hardening practices as carried out in Surface Combustion standard rated furnaces is contained in a bulletin, designated as No. SC-131, issued by Surface Combustion Corp., Toledo, O. A photomicrograph of steel in spheroidized and in hardened state is shown along with ideal types of furnaces for various methods of hardening. Illustrations of hardened steel parts and actual oven, pot, atmosphere hardening and isothermal quench furnace installations are also included.

—o—

A new color described as being sufficiently near daylight to meet ordinary needs for color discrimination and at the same time warm enough in tone to be pleasing for indoor illumination uses is a recent addition to the line of fluorescent lamps manufactured by General Electric Co., Cleveland. Designated as 4500-white, lamps of this color are available in from 6 to 100 w sizes.

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as advanced by

CHICAGO METAL HOSE CORPORATION

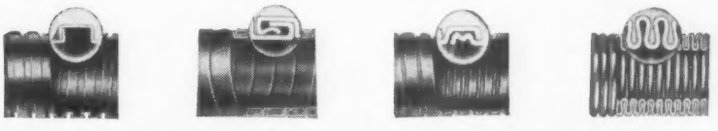
the science of FLEXONICS ..."the controlled bending of thin metals for use under varying conditions of temperature, pressure, vibration and corrosion"—is exemplified in the basic products of Chicago Metal Hose Corporation.

• Rex-Weld, Rex-Tube and Rex-Flex are *branded* flexible metal hose. Each of these—as well as C.M.H. Stainless Steel Bellows, Compensators and allied products—is manufactured with the increased product knowledge which the Science of Flexonics makes possible.

Chicago Metal Hose Corporation continues to devote its energies to this science. Just as C.M.H. has developed new *basic* products in the past, so it continues that development. These accomplishments—and this continued progress—have resulted in recognition of Chicago Metal Hose as the leader in the design and manufacture of flexible metal hose and allied products. For product application guidance, C.M.H. has data available—derived from the Science of Flexonics. Chicago Metal Hose Corporation welcomes the opportunity of putting its knowledge of this science to work for you.

Photograph by courtesy of Standard Oil Company of California.

"FLEXON" *identifies C. M. H. products, which have served industry for more than 44 years.*



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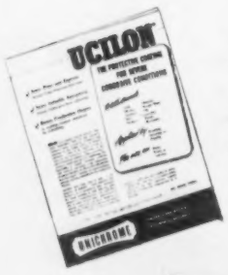
CORROSION IS COSTLY—for replacing corroded equipment takes big bites out of your profits. So does frequent protective-maintenance—though it's the lesser of two costs. But with Ucilon, you save *both* ways—by stopping corrosion losses, by reducing maintenance expense. For Ucilon is a finish for concrete, metal or wood that outlasts all ordinary protective coatings!

Let's take a really tough application, for example—a large, sewage disposal plant:

Protective coatings of Ucilon were applied to sedimentation tanks, chlorination equipment, gas receivers, equipment embedded in wet sewage, and all metal work. Results? Ucilon outlasted *any other coating that was ever tried!* Even on outdoor steel manhole and tunnel covers, used as walks, Ucilon coatings were still in perfect shape after *7 hard months.*

In another typical case, a drug manufacturer coated panels in his bleaching room with Ucilon. They were totally unaffected by the caustic soda fumes—not even a sign of discoloration after 6 months of this severe test!



We invite you to try Ucilon on *your* toughest jobs. See if you don't agree that it outlasts any other protective coating you've ever tried. Write your nearest Unichrome office for details—and a copy of the descriptive bulletin shown here.

WHAT IS *UCILON**?

UCILON is a surface coating material formulated from new and improved inert synthetic resins. It is air drying and can be applied to any metal, wood, or concrete surface by brushing, spraying or dipping. Upon evaporation of the solvent, a hard, durable "plastic" coating is formed.

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**Ucilon is a trademark registered in the U. S. Patent Office, by United Chromium, Incorporated, for a synthetic resinous coating material.*

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Submerged Melt Welding

(*Continued from Page 95*)

grade A, killed for automatic submerged melt welding. The inside firebox sheets were carbon steel firebox quality to the railway company's specification No. 5.

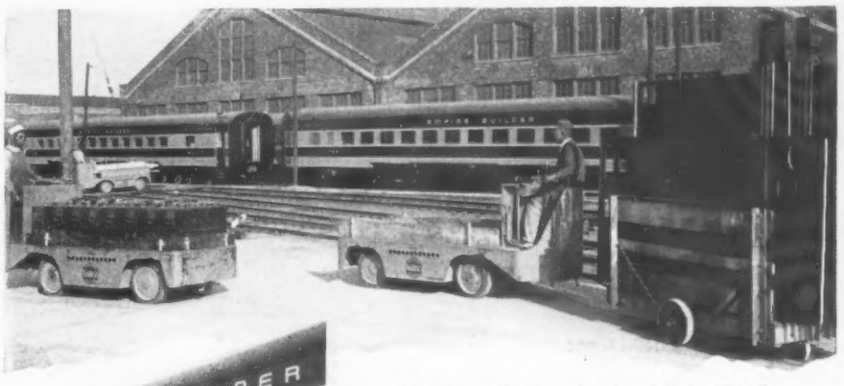
Girth and longitudinal seams of the barrel courses were prepared for automatic submerged melt welding on a plate planer, prior to rolling and forming. Both inside and outside back head, throat sheet, back tube sheet and fire door hole were prepared for manual welding by chipping and grinding. A tolerance of 0.015-in. was permitted in the gap between the plate edges which were automatic submerged melt welded and a ⅛-in. gap between joints that were welded manually.

To obtain the tolerance required for automatic welding it was found necessary to grind the butting faces prior to pulling them together. Large nuts were tack-welded to each side of the seams inside the boiler through which draw bolts were applied to hold the seams in line and for pulling the butting edges together. After each seam was lined up properly the plates were tack welded on the inside to maintain a good fit during welding on the outside. Clean-up grinding of the plate edges also was done to remove all dirt and scale which might have otherwise caused defects in the weld metal. After the outside welds were completed, the draw bolts, nuts and tack welds were removed and the inside of the seam made ready for welding.

Welding Procedure: Welding was in accordance with the ASME locomotive boiler code. Procedure qualification and operator's qualification tests were made to determine the suitability of the welding technique employed, welding apparatus, electrodes, plate material and welding operator's ability to produce sound welds, under conditions similar to those used during erection of the boilers. The procedure qualification tests consisted of welding joints similar to those required for erection of the boilers, using the welding and rotating equipment employed during construction. A record of all qualification tests was kept for future reference.

The automatic submerged melt welding process was used to weld all longitudinal and girth seams where practical. Test plates were attached to the longitudinal seams of each barrel course and welded continuously with the seam. Identification marks were attached to each test plate so that they could be identified in relation to the course from which they were taken. Test plates were stress relieved with the boilers and then given the physical test required. Physical test applied to the test coupons showed

20 BAKER TRUCKS mean 80% savings in handling costs at PULLMAN-STANDARD



Typical yard scene showing 3 Baker Platform Trucks hauling miscellaneous materials to cars. Truck at right doubles as tractor hauling trailer load of car partitions.

Baker Fork Truck carrying crated air conditioning unit, passing in front of nearly completed car for Great Northern's famous "Empire Builder" train.

Proper handling is extremely important at the Pullman-Standard Car Manufacturing Co.'s Chicago Plant. The various buildings are scattered over a wide area. A great variety of materials and fabricated parts are received on flat cars, in box cars or highway trucks. These must be unloaded, stored, and moved from storage to fabricating plants or to cars in the process of building. Where possible, materials are handled on skids or pallets, and transported by fork or lift trucks. Miscellaneous items are handled on platform trucks.

20 Baker Trucks, comprising fork trucks, low- and Hy-Lift trucks, platform trucks and crane trucks, form the basis for their modern, mechanized material handling system. Trucks are subjected to strenuous, continuous service indoors and out. According to the superintendent, they are giving highly satisfactory service—effecting an estimated saving of 80% in handling costs.

The Baker Material Handling Engineer can show you how similar savings may be made in your plant. Phone our nearest agent or write us direct.

Space in warehouse is conserved by tiering. Baker Fork Truck uses detachable fork extensions for handling crates 80 inches long.

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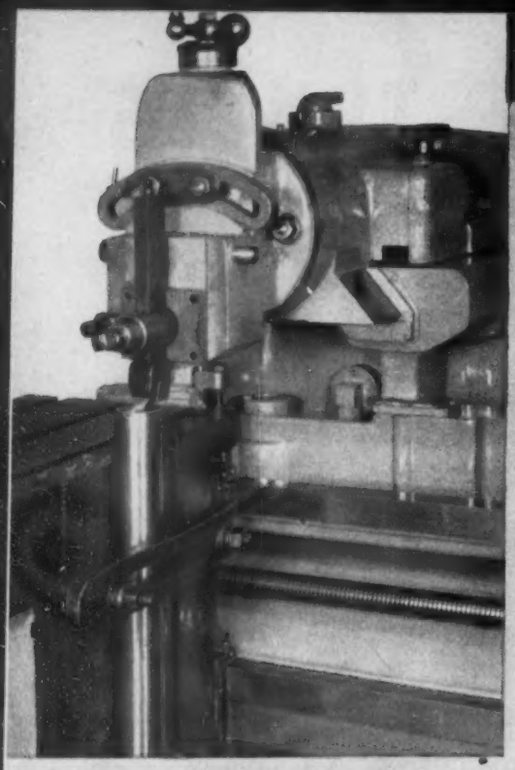
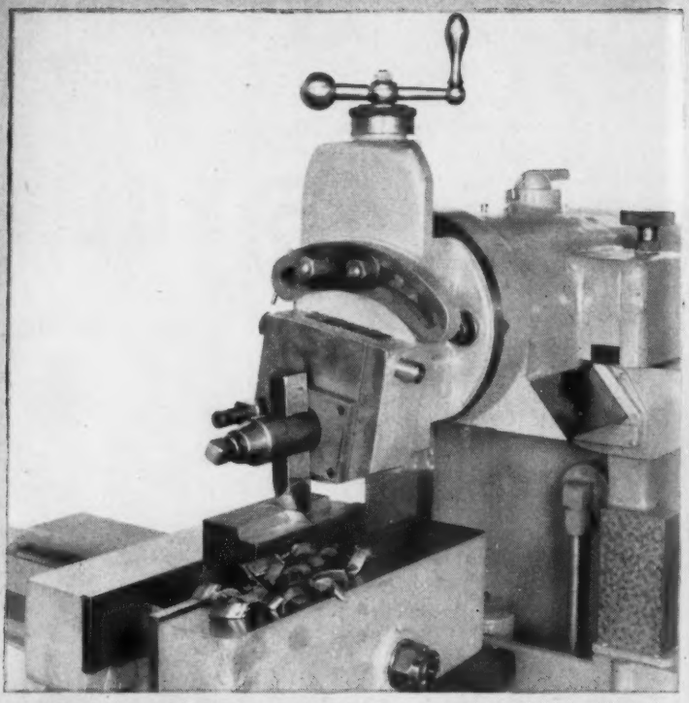
Baker INDUSTRIAL TRUCKS





SHORT STROKE . . . slotting keyway in end of shaft. Extremely short cutting and return strokes may be set at high speeds . . . without causing vibration or affecting smoothness of cut. Adjustment for any speed or stroke length is made quickly and easily by a simple setting of stroke adjustment levers . . . an important advantage in small lot production.

ROUGHING CUT . . . note size of chips. Rugged construction and abundant power make heavy-duty work an "every-day job" for a Rockford Hy-Draulic Shaper. Hy-Draulic design is also a safeguard against excessive feed and resultant overloading. The hydraulic system provides a predetermined maximum pressure, ample for every type of job; when an unsafe overload is met, ram will stop, as oil by-passes.

can you compete . . . ?

Why not make sure of your shaper equipment now. Ask yourself, could you compete with the work turned out on a new Rockford Hy-Draulic. Compare the work turned out on your present equipment with that of a champion in terms of cost, accuracy, operating ease or speed. Rockford Hy-Draulic Shapers give you accurate, infinite control of stroke and feed. They also give operating advantages that only Hy-Draulic design can provide. Put a Rockford Hy-Draulic Shaper through its paces and watch it perform on every type of shaper job. Write for Shaper Bulletin 442.

ROCKFORD MACHINE TOOL CO.
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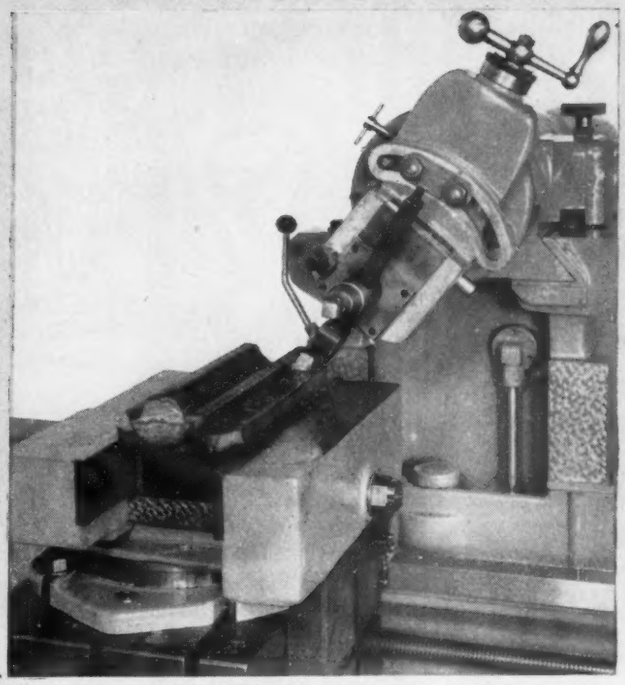
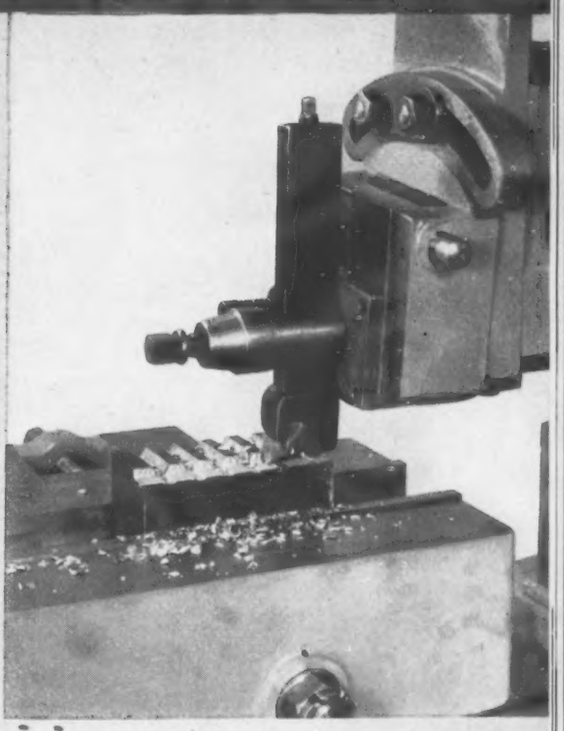
470

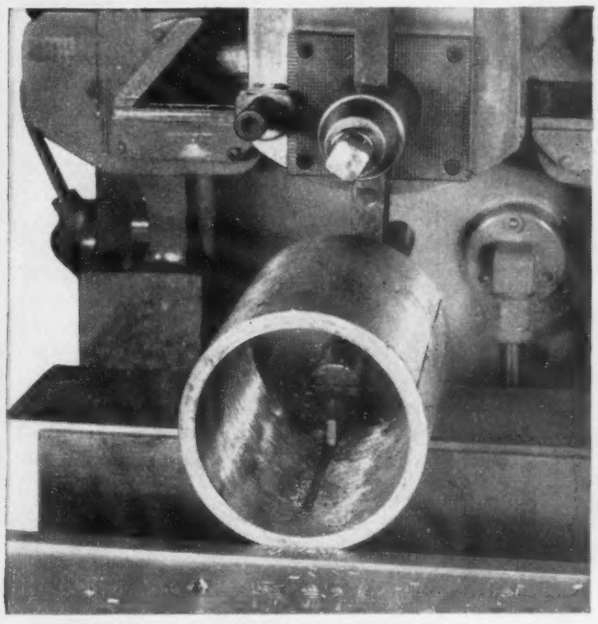
Hy-Draulic



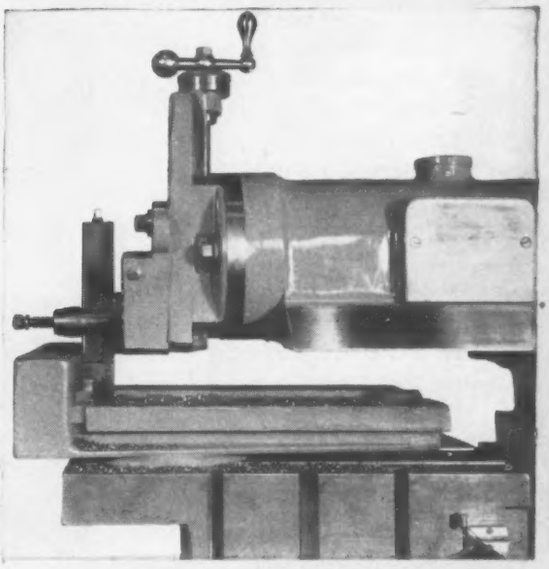
ANGLE CUT . . . cutting a dovetail on a slide. Precision of Rockford Hy-Draulic Shaper construction assures work accuracy and fine surface finish.



INTERMITTENT CUTTING . . . cushioning effect of hydraulic system makes interrupted cutting an easy operation for both tool and machine. Eliminates shock as tool enters each cut . . . protects tool against rapid wear and breakage.

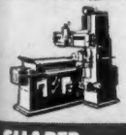


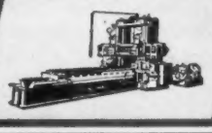
CUTTING TO A LINE . . . cutting keyway up to a drilled hole. As in the preceding illustration, this work set-up is an example of the accuracy in stroke length maintained by the new Rockford Hy-Draulic Shapers.

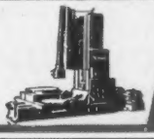


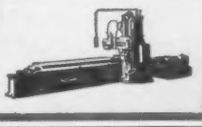
CUTTING TO A SHOULDER . . . this illustrates ability of shaper to maintain stroke length exactly. Whatever the stroke length or speed, it can be demonstrated that the new Rockford Hy-Draulic Shapers will cut-to-a-line with an accuracy far greater than required by any conventional shaper set-up.

36" OPENSIDE PLANERS SLOTTERS SHAPER-PLANERS



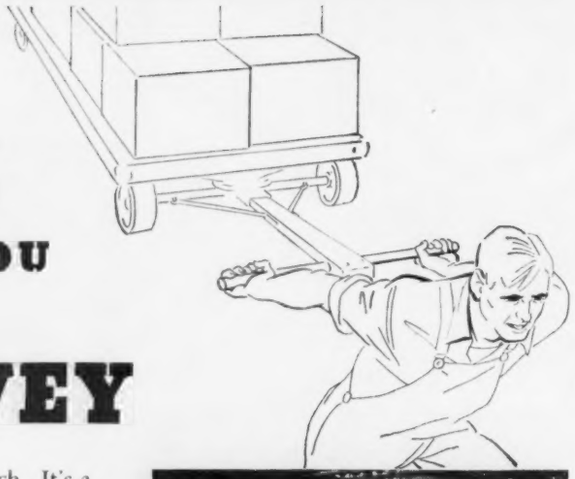






Hy-Draulic

SHAPER



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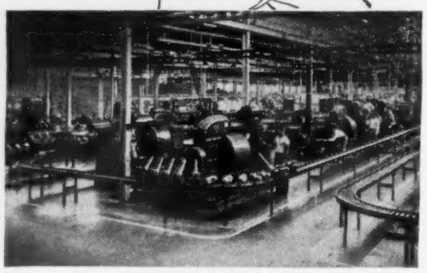

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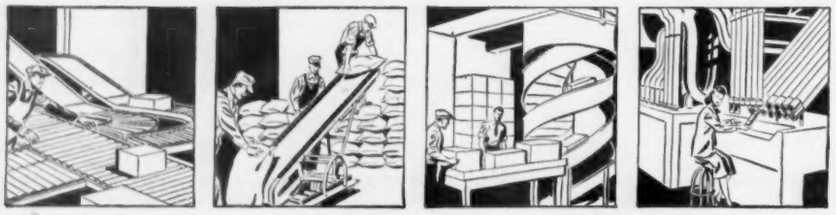
Cases move fast into cars on sectional roller conveyors — with less manual handling.



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the joint to be superior to the parent metal in all cases. The total length of fillet and butt-welds required:

Fillet Welds

1/4″	658″	(54′ — 10″)
3/8″	713″	(59′ — 5″)
1/2″	730″	(62′ — 6″)
7/8″	318″	(26′ — 6″)

Butt Welds

3/8″	586″	(48′ — 10″)
1/2″	206″	(17′ — 2″)
9/6″	113″	(9′ — 5″)
25/32″	299″	(24′ — 11″)
27/32″	775″	(64′ — 7″)

All fillet welds and a small percentage of the irregular butt welds were made with the manual arc using AWS E-6011 electrodes.

X-ray was carried out in line with the ASME locomotive boiler code requirements. For ease of locating possible defects, lead numbers were attached to a cloth strip at 2-in. intervals. The cloth was then attached to the boiler, close enough to the weld so that the lead numbers would show up on a 4½ x 17 in. x-ray negative. The numbers started at the front of each longitudinal seam and at the front longitudinal seam running counter-clockwise when x-raying the girth seams.

Light center punch marks were also made alongside each seam at 10-in. intervals, to which lead arrows pointed, serving as a permanent means of locating defects. When, for example, a defect was found on an x-ray negative, the negative itself was placed on the boiler and positioned exactly by placing the center punch marks on the negative over those on the boiler, thereby eliminating any possible mistakes in locating defects.

American Locomotive Co. installed in 1945, at its Schenectady plant, a car-bottom indirect heating stress-relieving furnace, which is fully automatic on its heating, soaking and cooling cycles. Before placing a boiler in the stress relieving furnace, the foundation ring was bolted in place and the back head, wrapper sheet, throat sheet and boiler shell were thoroughly braced to prevent distortion. After the boiler was mounted on the furnace base, thermocouples were attached at various locations of the boiler for control of heat input to the light and heavy section during the stress-relieving operation.

The stress-relieving temperature was raised 100° per hour until a maximum temperature of 1175° F was reached. The furnace was held at this temperature for 2½ hours and cooled 100° per hour until a furnace temperature of 200° was reached before the boiler was removed from the furnace.

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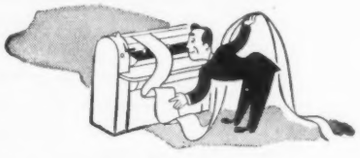

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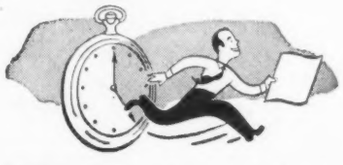

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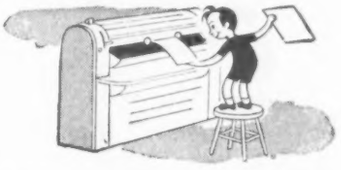

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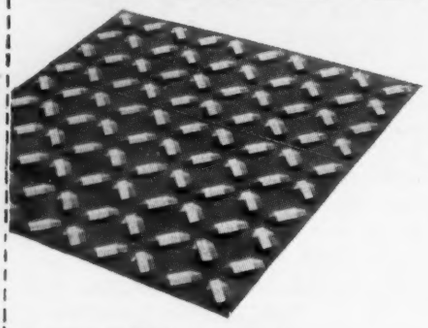
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flues, stay rods and other internal fittings were applied.

The boilers were hydrostatically tested to one and one-half times the maximum allowable working pressure, and while under this pressure all unstayed seams were hammer tested by striking each side of the seams at 6 in. intervals. The boilers were then given the usual final steam test for locomotive boilers.

Research Apparatus Control Problems Solved

An automatic duplex-type switchgear recently solved problems in speed and current regulation for a large piece of rotating apparatus used for aircraft research, according to General Electric Co., Schenectady, N. Y. Apparatus controlled consists of a large wound-rotor induction motor that consists of three units which drive test apparatus through a common shaft. Each motor unit is energized at high voltage from a common bus through an individual transformer and circuit breaker, control being by a liquid rheostat in the rotor circuit.

Chief problem in the control equipment revolved about the basic requirement that the large block of lead required by the motor could not be picked up or dropped too quickly without seriously disrupting power supply lines. Necessity for accurate speed regulation was the other major problem.

The three motor units now are energized one at a time at definite time intervals, thus solving the first problem of surges on the power lines. An electronic regulator also functions to hold the current increase at a predetermined rate. Current is reduced at a regulated rate and then the motors are de-energized at definite time intervals during a normal shutdown.

Motor drive and its auxiliaries have protective devices which are divided into groups, going into operation automatically depending upon the nature of the trouble. A fault affecting only one circuit or one motor unit trips off only one motor. Current input to the remaining motors is then reduced at a predetermined rate and the motors are de-energized at definite time intervals.

Troubles affecting the entire drive trip off the entire load immediately while others which can be remedied by an attendant without shutting down the system operate an annunciator and sound an alarm. An electronic regulator holds the motor speed to a high degree of accuracy at the desired value.

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Although similar in physical characteristics to No. 520, Wilson No. 520A has been designed for use on chrome-moly where extremes in tensile strength after heat treating are not required. This electrode also proves its versatility as an all-position rod on thin mild steel. The arc is spray type, yet adaptable for thin parts because of its light penetration. Its ease of operation is particularly noticeable in vertical and overhead positions.

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Induction Hardening of Steel

(*Continued from Page* 97)

and the case is thin.

It is cheaper to produce a shallow carburized layer than a deep one, and therefore, from an economic angle the thin case will be favored when a part is carburized. For induction hardening the reverse condition is generally true. A deep case depth is cheaper to produce than a thin case, because the initial cost of the low frequency equipment is less than for high frequency equipment. However, for a given oscillator with constant frequency and induced current, the cost increases with increasing case depth, because a longer heating time (therefore greater power consumption) is required.

There are other reasons for favoring or requiring a shallow case on induction-hardened samples. They are to reduce the distortion, to decrease the machining costs by minimizing or eliminating completely final grinding necessary to correct for distortion and remove scale and, where it is necessary, to machine or drill through the surface zone, and to produce the thin case depth that will be needed if the part or section being hardened is small in size.

To summarize, the purpose of case hardening is to produce a steel part that has good wear resistance, and still retain toughness and strength to resist failure from fatigue or impact. The depth of the hardened case required is dependent upon the service requirements and life desired, subsequent machining operations, and the cost factors involved. Accordingly, in the selection of induction heating equipment one of the factors to be considered is the depth of hardening which can be obtained. In the past, the effect of frequency on the depth of hardening has been emphasized more than the other factors (power, heating time, temperature, metallurgical response, etc.), which have a great effect upon the case depth of the hardened sample. It will be shown later that frequency is important, but only if the other factors also are favorable.

Definition of Case Depth: The term case depth or depth of hardening is used freely to define the hard layer at the surface of the case-hardened part. Case depth is difficult to define, and exam-

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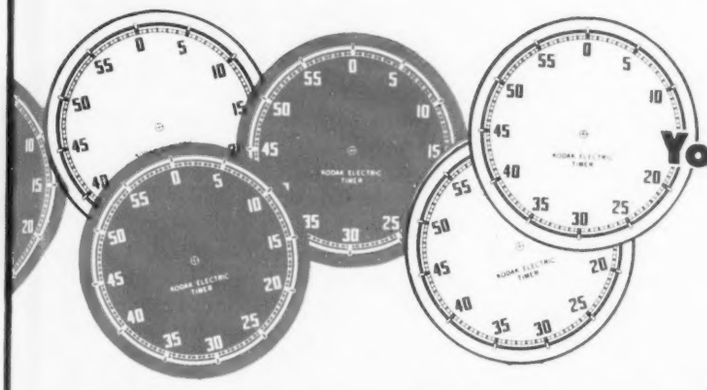

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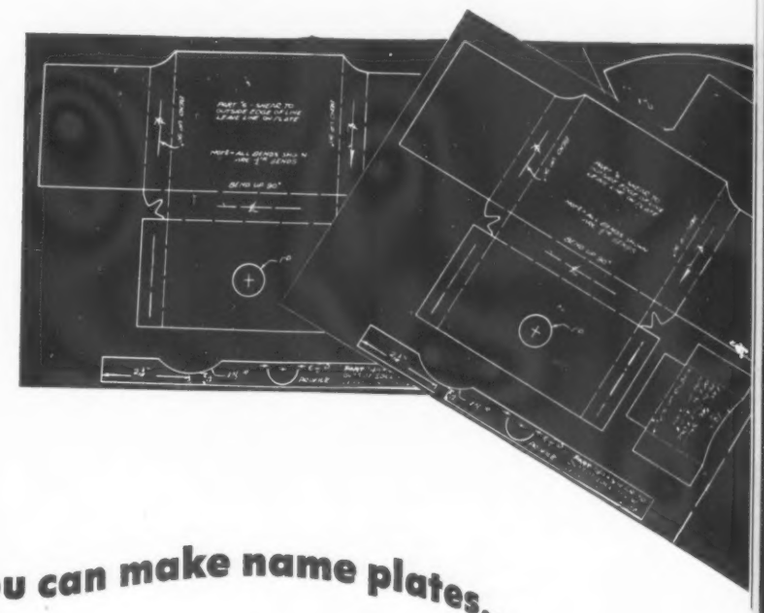

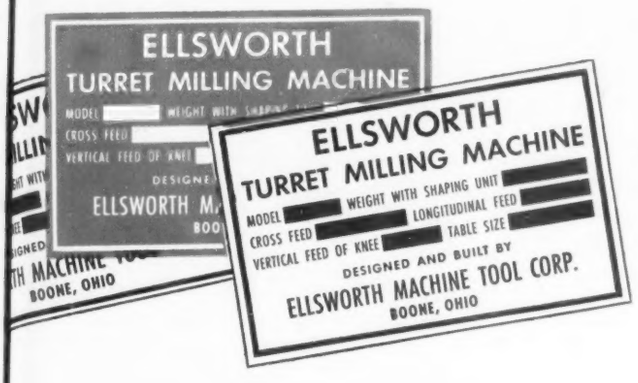

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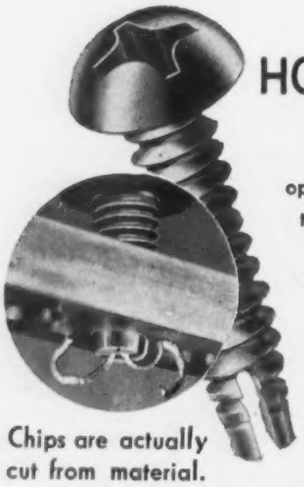

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Unretouched photo shows progressive "locking bite" of washer teeth as screw is driven in. When setup, screw head is securely anchored in the material to effect a tighter, stronger, vibration-resisting fastening.

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ination of Fig. 47A indicates why. Between the martensitic case (OX) and the unhardened core is the zone (XZ) where martensite, undissolved carbide, and pearlite exist together*. Should this transition zone (XZ) be considered a part of the case? That is not likely to be answered until we learn more about the properties of the case, transition zone and core. It is evident from Fig. 47A that a precise definition by microscopic examination is troublesome to make because of gradual changes from case to core. Our designation of OY as the case depth is purely arbitrary. Another observer may choose OX, or OZ, and with equal justification.

For convenience and accuracy, a definition based on the hardness penetration curve has merit. The case depth could be defined as the distance from the surface at which the hardness (microhardness) is half-way between that of the surface and the core. The case depth determination by the half-hard method is indicated in Fig. 47B. For those investigators interested in obtaining qualitative case-depth measurement on various steels, this method offers best possibilities for accurate determination. In general, however, the microscopic method is satisfactory, and it is likely of little concern if the case depth is defined as OX, OY or OZ, Fig. 47A.

Factors Influencing Case Depth: The reasons for varying the case depth were discussed in a previous section. Therefore, assuming that it is desirable to harden various parts to different case depths, the question arises as to how to accomplish this with induction hardening.

The case depth depends upon the metallurgical response of the steel to the heating and cooling treatments, the temperature distribution over the cross-section of the sample, and the length of time the metal was above the Ac_3 temperature. Quantitative data are not available on the effect of these factors on case depth. It is possible, however, to make some generalizations on the basis of available information.

Effect of Metallurgical Response on Case Depth: It was shown in a previous section that the austenitizing response of the steel was related to the composition, quantity and distribution of the carbide phase. Best austenitizing characteristics were obtained in steels with a high carbon content (above about 0.50

*Almen refers to three zones in an induction sample, an outer layer that is heated above hardening temperature, a second zone that is heated below the hardening temperature, and the core material which is not heated at all[41]. By this definition, the second zone does not correspond to the transition zone XZ where martensite exists with ferrite and pearlite, but to a zone near Z where the metal was heated below the hardening temperature. This zone may not be revealed by microscopic examination, since the structural changes below the critical temperatures are not pronounced.

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per cent), uniform distribution of the carbides (a sorbitic structure is ideal), and containing those elements which do not form complex carbides (Ni, Mn). It appears that a uniform carbide distribution is the most important factor in its effect on case depth. For example, it is difficult if not impossible to obtain a shallow case depth (0.015-in.) with 500 kc current on a ½-in. round bar of 1045 steel with a furnace-cooled initial structure, but quite easy to obtain such a case depth in the same steel with a sorbitic initial structure. The pearlite in the furnace-cooled sample will transform to austenite very rapidly when heated above the Ac_3 temperature, but the massive free ferrite retards the reaction and makes it impossible to obtain a shallow case. (The TTT curves for these two structures are compared in Fig. 34, STEEL Jan. 27, 1947, p. 82). Therefore, it appears definite that massive free ferrite should not be present in the microstructure of a sample if a thin case depth is required.

On the other hand, if a deep case is desired, the austenitizing characteristics of the steel are not as important; instead, the critical factor may be the hardenability of the steel. In this instance, the addition of alloys to the steel will generally solve any difficulties resulting from shallow hardening.

Temperature Distribution on Case Depth: The temperature distribution over the cross section of the induction-heated sample is one of the deciding factors that determines the case depth of the quenched sample, since only that part of the sample which was heated above the Ac_3 temperature will have the opportunity to transform to austenite. Therefore, the case depth corresponds roughly to the depth to which the temperature was above the Ac_3 temperature. In Fig. 47 the Ac_3 corresponds to X and the Ac_1 to Z. The temperature is greatest at the surface, and lowest at the center. Temperature gradient between the surface and core depends upon the current density distribution, the surface temperature and the time.

Induction heating is resistance heating resulting from the flow of induced current in the metal charge. The temperature is related to the heat developed in the metal, and the heat in turn is related to I^2R. Rate of heating and the surface temperature is increased in proportion to the square of the current. The temperature gradient is related to the current distribution curve, which depends upon the frequency, permeability, and resistivity. Significance of this becomes clearer with the aid of several diagrams.

In the preceding section on the frequency and power of the oscillator, curves were presented to show the effect of frequency, resistivity, and permeability on the value of δ, the effective depth of penetration of current, Fig. 11, STEEL, Jan. 13, 1947, p. 81, and to show the importance of power (current) on the temperature curve, Fig. 12. The results in Fig. 11 are misleading in regards to case depth in that no consideration is given to the current gradient across the sample. For example, in Fig. 48, the distribution curves are given for an SAE 1045 steel at 850° C for five values of frequency ranging from 1000 cycles to 10 megacycles. Note that as the frequency increases the current gradient also increases. Thus, the temperature gradient will likewise be much sharper for the higher frequency current, and as a result we should expect to find a narrower transition zone with high frequency than with low. Of course, the sharp temperature gradient favors rapid conduction of heat to the cold core, and this tends to broaden slightly the transition zone.

The equation for the curves in Fig. 48 is:

$$I_x = I_o e^{-x/\delta} \qquad (1)$$

where $$\delta = 1.98\sqrt{\frac{\rho}{\mu f}} \qquad (2)$$

at 850°C $\delta = 26/\sqrt{f}$ for an SAE 1045 steel

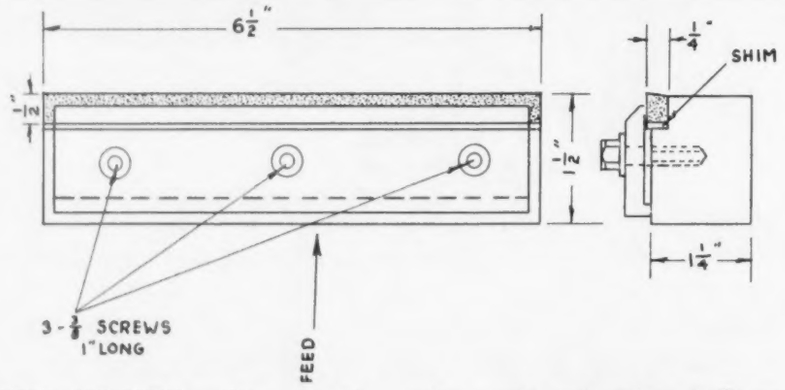
The curves have been plotted for 850° C instead of room temperature conditions (as is the usual practice), because it is believed a clearer picture is obtained of the actual conditions which exist in the steel when it is heated above the Ac_3 temperature. For example, in Fig. 51 the current curves for 415° C and 850° C are compared. Note the great increase in current penetration with the increase in temperature. This increase in δ (0.001 to 0.037) resulted from a decrease in permeability (100 to 1), and an increase in resistivity (19.5 to 172), and corresponds to a decrease of frequency from 500,000 cycles to 550 cycles!

In other words, the changes in permeability and resistivity which occur between 15° C and 850° C are equivalent to decreasing the frequency by a factor of 1/900th, or equivalent to the change in current penetration that would result if the frequency was dropped from 9000 cycles to 10 cycles. The changes in resistivity and permeability neutralize some of the beneficial effects of frequency in decreasing case depths. In this connection, it should be mentioned that alloy steels with higher resistivities than plain carbon steels will have deeper penetration of current for the same frequency.

As mentioned before, it is not the current distribution curve that determines the case depth, but the temperature curve. The magnitude of the induced current is the important factor in determining the heating rate and the surface temperature. One definite requirement for producing a thin case is to concentrate high power into the surface layer, as illustrated by the use of the current transformer where the values may reach 100 kw per square inch.

Effect of Time on Case Depth

The metallurgical response of the steel may be satisfactory, and the temperature distribution may be favorable for shallow hardening, but it is also necessary that the sample be held above



NEW WRINKLE: From Detroit, Carboloy Co. reports reconditioning extremely hard-chilled iron rolling-mill rolls was simplified and speeded up by one company by using a cemented carbide tip on the refacing tool used on a plunge cut turning operation. Dimensions of the roll were 20½ x 53 in. Refacing tool, note sketch, was mounted on the lathe bed using a yoke and wedge. Roll was turned to provide cutting speed of 15 sfpm, and tool fed into cut by means of a wedge. Wedge fed tool into cut each time former was struck with a hammer, scarcely ideal, but effective. As carbide tip was reground, shim was placed behind tip so shank would not have to be reground. No tool breakage was experienced, according to the company

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In 1872, a man stepped off the train in Greenfield, Massachusetts, bringing with him a patent for a revolutionary kind of a threading tool—a two-piece die* which would cut accurate threads in one simple operation. The man was John J. Grant. Thus, 75 years ago, began an industry which was to grow until this quiet New England town became the world's center for the manufacture of precision threading tools.

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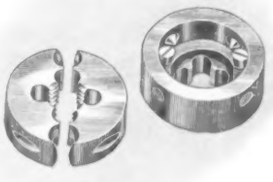

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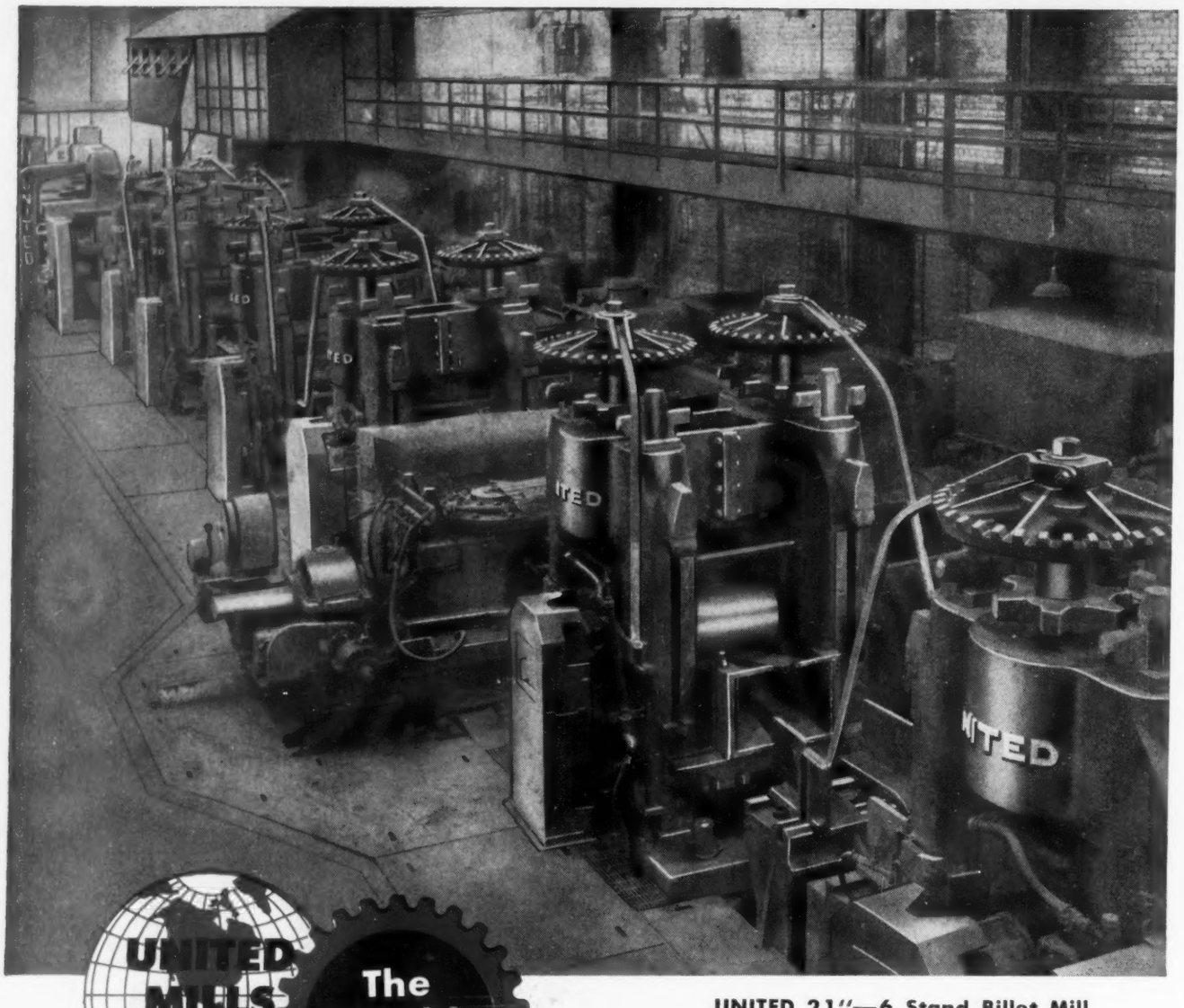
A DIVISION OF GREENFIELD TAP and DIE CORPORATION



UNITED 21"—6 Stand Billet Mill

IN Canada, South America, Mexico, England, France, Belgium, Russia, China, India and other countries of the world . . . United equipment is helping to meet the demand for increased steel tonnage.

Here at home, UNITED designed and built mills and machinery are in use in practically every prominent rolling mill plant in the ferrous and non-ferrous industries, and in hundreds of other plants engaged in special rolling of metals of every conceivable shape and analysis.

This universal acceptance of UNITED products is the result of sound engineering, constant research and more than 45 years progressive development in design and construction of rolling mills and auxiliary equipment.

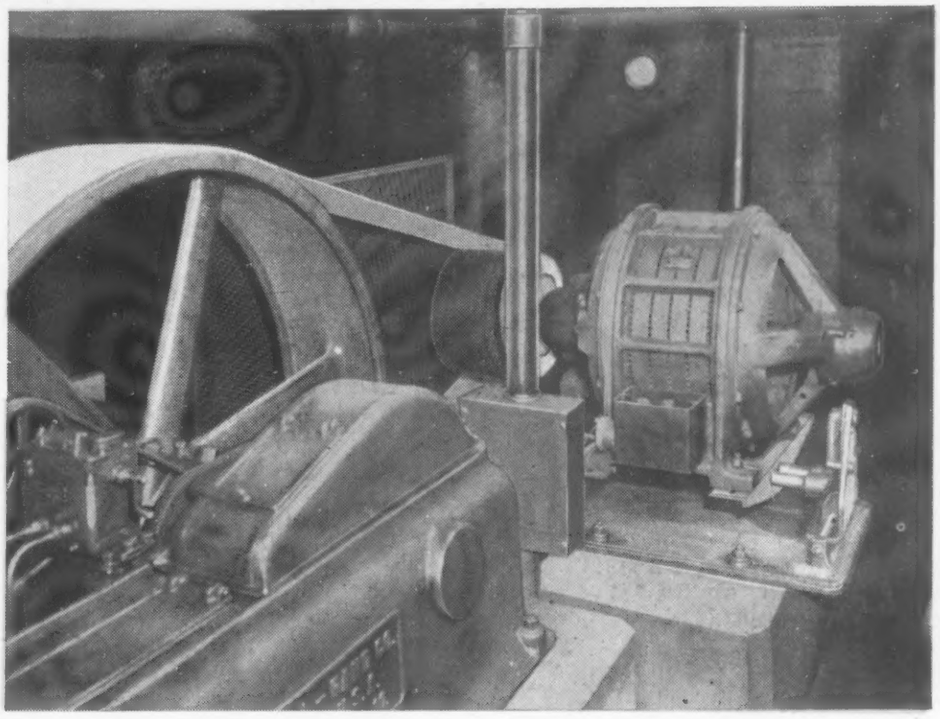
UNITED's engineers are singularly fitted to deal with *your* rolling problems. Why not consult them.

UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

Plants at Pittsburgh · Vandergrift · New Castle · Youngstown · Canton
Subsidiary: Adamson United Company, Akron, Ohio
Affiliates: Davy and United Engineering Company, Ltd., Sheffield, England
Dominion Engineering Works, Ltd., Montreal, P. Q. Canada

How much IS BELT SLIP COSTING You?



This is a typical installation of an American Econ-o-matic Drive operating on an air compressor. Since its installation in 1939 there has been no trouble with belts slipping or burning, and belt life is at least three times longer than that of former drive.

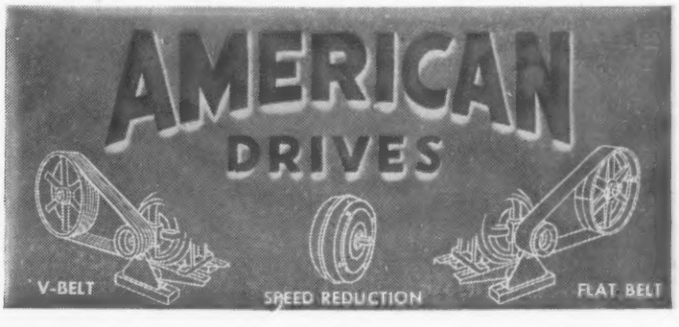
● Regardless of how efficient the valves, pistons and other working parts of an air compressor operate, it is impossible to get rated capacity from the unit unless it is driven at the *proper speed*. To get this proper speed means that not only the drive ratio will have to be right but *belt slip will have to be eliminated.*

Correct drive ratios can be easily computed. Belt slip can be easily eliminated by using American Econ-o-matic Drives.

American Econ-o-matic Drives eliminate belt slip because they automatically match the belt-tension to the load on the motor. When the load increases, the belts are automatically and instantly tightened to eliminate slip. When the load decreases, belt-tension is decreased—thus reducing wear on both belts and bearings.

Whether or not you operate compressors, Econ-o-matic Drives will give your flat or V-belt, short-center driven equipment the advantages of increased output, longer wear and reduced maintenance. Write today for more information on American Econ-o-matic Drives.

The American Pulley Company
4284 WISSAHICKON AVE., PHILADELPHIA 29, PA.



HELP *Speed* PRODUCTION SCHEDULES

with

DETROIT

— Power —

SCREWDRIVERS

Amazing speed—ease of operation!—Will drive standard machine screws, sheet metal screws, self-tapping screws with standard round, flat, binder, fillister, or hex heads and special heads.

DRIVES SCREWS AT ONE SECOND EACH

•

ALL SCREWS DRIVEN TO UNIFORM TENSION

•

NO MARRING OF HEADS

•

MODEL B PICTURED

drives screws from No. 6 to No. ¼ in lengths 3/16 to 1½ inches.

2 Other Models. Model A drives screws from No. 2 x ⅛ to No. 6 x ¾. Model C, from No. ¼ to ⅝.

Motorized HOPPER UNITS

Speedy Sturdy Dependable

USED WITH:

Presses, Centerless Grinders, Thread Rolling and Slotting Machines, or Special Machine. Made in 4 diameters, 10" 12", 16" and 24".

FEED:

Screws, Screw Blanks, Rivets, Pins, Discs, Nuts, Bearing Rollers, Steel Balls, Washers.

MADE IN 4 DIAMETERS: 10', 12', 16', 24'

Send Samples for Details and Prices

DETROIT POWER SCREWDRIVER CO.

2811 W. Fort Street
DETROIT 16, MICH.

the Ac_3 temperature a certain minimum time in order to austenitize the sample. This austenitizing time will depend upon the temperature, and become shorter as the temperature goes higher. If the sample is heated at a high rate (that is, if the time for austenitizing is short), it must be heated to a higher temperature to austenitize than if the rate is low.

The effect of increasing temperature (also increasing heating time) on the case depth is shown in Figs. 50 and 52 for two steels. Note that the SAE 2350 steel hardens at lower temperatures, and is deeper hardening than the SAE 1045 steel. For each steel a certain minimum temperature (that is, a minimum heating time) must be exceeded during heating to austenitize completely the surface layer. Heating for a longer time beyond the minimum results in deeper penetration of the austenite zone.

The hardness gradient of the nickel steel is sharper than for the plain carbon steel, and probably due to the presence of massive free ferrite in the 1045 steel which retards the reaction and tends to broaden the transition zone. It would be of interest to know what effect the width of the transition zone will have on the internal stress pattern. It may be advantageous to have a wide transition zone to act as a stress absorber between the case and core.*

Minimum Case Depth

To summarize briefly, there are many factors which effect the case depth of an induction hardened sample. The metallurgical response, the ampere-turns coupled into the charge, the frequency of the induced current, the size and shape of the part, the permeability and resistivity of the charge, the temperature-time conditions, are all factors which may greatly influence the case depth.

The importance of each varies with the equipment and material, but in most instances the desired results are obtained by balancing a number of factors.

The effect of frequency upon the "minimum" depth of hardening is plotted in Fig. 49. This curve is empirical and is based on information in the literature as well as the authors' results. It is reproduced to illustrate the effect of frequency, but also is intended to show that case depth is not a function of the frequency alone. The shaded areas indicate that case depth may vary greatly depending upon the response of the steel, the power concentrated in the part, the temperature-time relations, the size and shape of the charge, etc. If conditions are favorable case depths near the lower

*Transition zone should not be confused with Almen's second zone which is defined as the layer heated below the hardening temperature. His zone is a tension-stressed layer, and he recommends that the zone be decreased to a minimum for highly stressed parts.

PUT YOUR CASTINGS in a *cleaning test tube*

When you bring your products to our demonstration laboratory we can show you exactly what type of cleaning machine is best suited to your cleaning problem and to the production volume you want to handle. Everything is here to give you the complete facts needed to compare your present practice, or any other cleaning method, with the results you can get with the world-famed airless Wheelabrator.

If you've been thinking about improving your cleaning practice and have been debating the pros and cons of various cleaning methods, here is a perfect opportunity to get positive facts. Hundreds of others like yourself have put the Wheelabrator to this test and it has proved, by convincing demonstration, why it is used in more plants than any other type of blast cleaning equipment. Let us arrange for such a test today.

American

WHEELABRATOR & EQUIPMENT CORP.

(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)

509 S. Byrkit St., Mishawaka, Indiana

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

EXCLUSIVE—

THERE'S ONLY ONE LEANING TOWER OF PISA . . . AND

ONLY ONE—

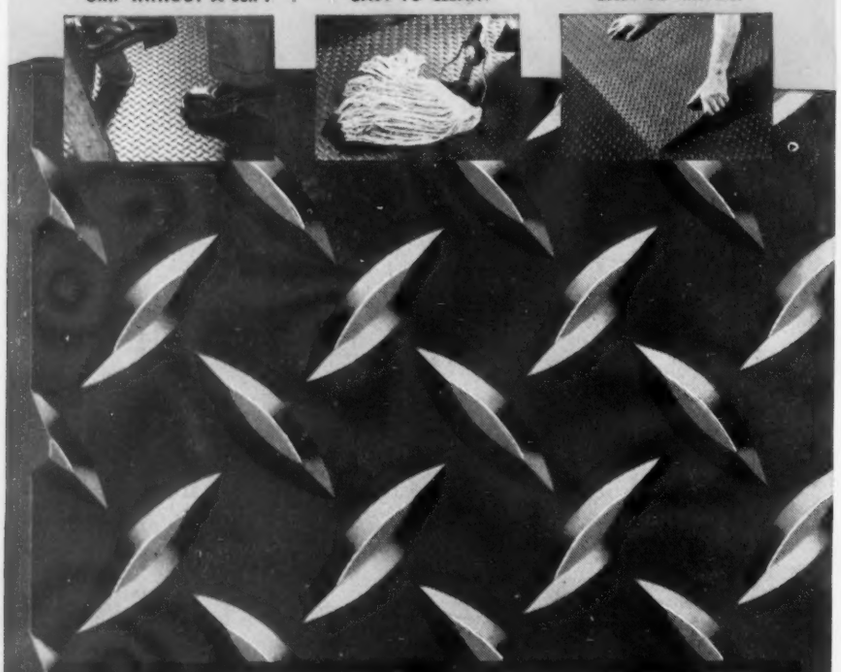
AW SUPER-DIAMOND

FLOOR PLATE

Often imitated, but never duplicated, AW Super-Diamond Pattern Floor Plate gives you three distinctive advantages that no ordinary floor plate can offer. It grips without a slip (prevents costly slipping accidents). It's easy to clean (water drains and dries rapidly). It's easy to match (prevents cutting waste). Insist on AW Super-Diamond Floor Plate for your every flooring need, and get the most for your money.

FREE Write for a copy of our New 16-Page Booklet L-29. It's packed full of helpful information. Alan Wood Steel Co., Conshohocken, Penna.

GRIP WITHOUT A SLIP! EASY TO CLEAN! EASY TO MATCH!



AW SUPER-DIAMOND

FLOOR PLATES THAT GRIP

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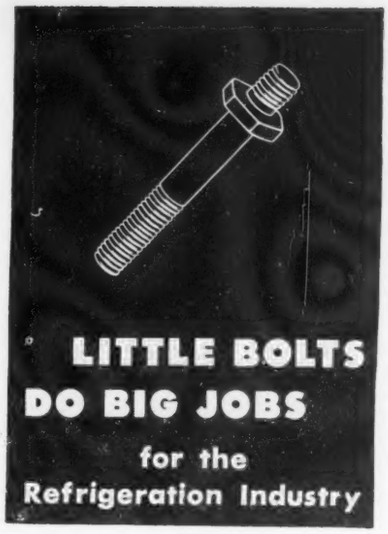
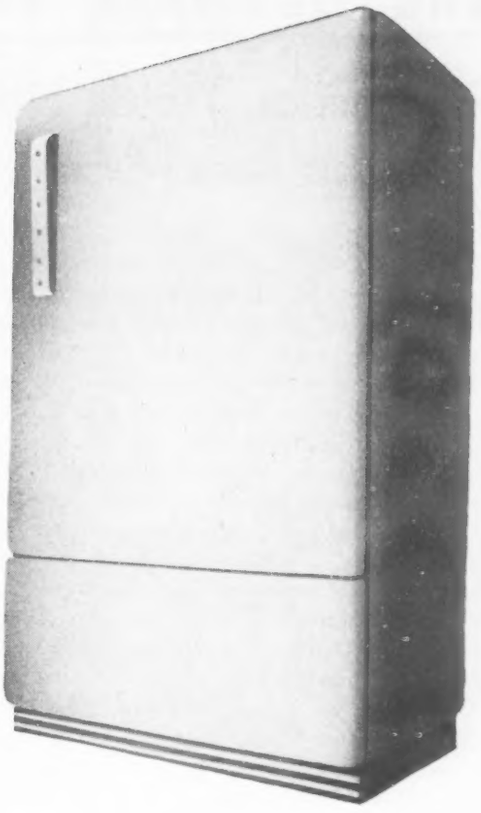
part of the shaded area are possible. For example, a case depth of 0.010-in. (half-hard value) has been obtained on a ½-in. diameter rod of 1 per cent carbon tool steel with 530 kc current of high amperage. To accomplish this, the sample must be heated very rapidly to minimize heat loss by conduction. This requires a high concentration of power into the surface layer. In the example cited, the heating rate exceeded 10,000°C per second, and the power density exceeded 100 kw per square inch (over 5000 kw per cubic inch of metal heated).

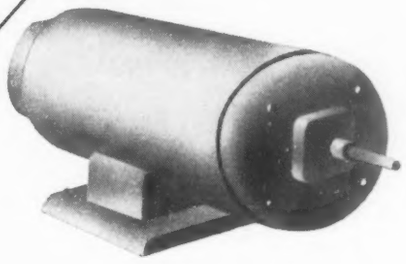
On the other hand, if the work piece was 3 or 4 in. in diameter, it would be difficult to couple sufficient power into the charge, because of power limitations in existing oscillators to obtain such a thin case, and a value closer to 0.030-in. would probably be obtained. Likewise, if the diameter of the bar was 1/16-in., it would be equally difficult to surface-harden the part with 530 kc current. Each induction heater has certain bar-size limitations because of the relatively fixed frequency and power ratings of the set.

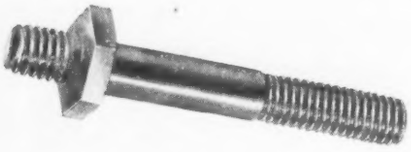
Uniformity of Case Depth: The uniformity of the case depth over the cross section of numerous parts was demonstrated in several illustrations (Figs. 1, 6, 7, STEEL, Jan. 13, 1946, p. 79 and 80), and the uniform case depth was also shown for the longitudinal sections of several parts. However, in some parts, particularly gears, the case depth is uniform on the end surface, but not on the section through the face. For example, consider the gear in Fig. 46A. The end section shows beautiful contour-hardening, but examination of the section through the root at RO is disappointing, because it shows that the surface was hardened only at the edges, Fig. 46C. The gear was machined to one-half its face thickness to show that the center of the face was hardened only at the tip of the tooth, Fig. 46B. In view of these results, it would seem to be a worthwhile procedure to examine gears on various sections to check the uniformity of the case depth. Heating the gears for a longer time will sometimes enable the root to be hardened, but the edges will likewise harden to a greater depth. The problem of uniform hardening of gears is important, and additional information of the effect of frequency, power, coil design, metallurgical response, etc. on the uniformity is needed. Life-test results on the hardened samples would also be valuable information for the engineer to have for design purposes.

NOTE: All references may be found by referring to previous articles appearing in connection with this series. See STEEL, Jan. 13, 20, 27 and Feb. 3, 1947, pp. 115, 78, 107 and 154 respectively.



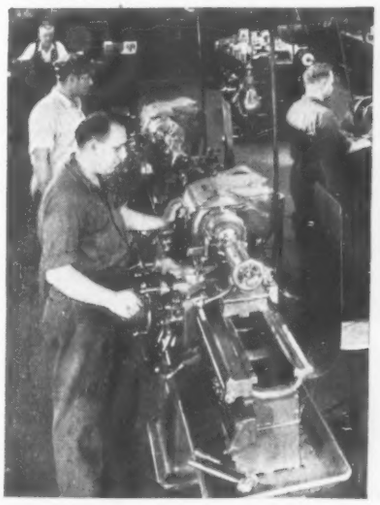






THE complexity of modern, manufactured items reflects itself in the increasing demands for special type nuts and bolts. The unusual bolt illustrated, for example, is a *vital* part of the compressor unit of a well-known national brand refrigerator . . . *convincing evidence that little bolts do big jobs for big industry.*

Whether they are standard or special, all circle Ⓑ products have the same uniform, controlled quality that serves to make your production more efficient . . . your products more salable.



DID YOU KNOW *that we have our own large machine shop where dies are carefully made by our own skilled toolmakers?*

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The Business Trend

Production Holds Near Postwar Record Level

INDUSTRIAL activity in the week ended Feb. 1 declined slightly but continued to hold near the postwar record level, with the result that STEEL's industrial production index registered 156 per cent (preliminary) of the 1936-1939 average of 100. Index for the preceding week was 157, one point below the postwar high of 158.

STEEL—A very substantial factor in the high activity rate is steel ingot production, which recently has been at a new postwar high level of around 92.5 per cent of capacity. With the labor outlook improved, there is mounting confidence that steel production can continue at a high rate for some time and thereby go far in bringing the supply more into line with demand.

AUTOS—Contributing importantly to the current high rate of industrial activity is automobile production, which in the week ended Feb. 1 was estimated at 95,295 passenger cars, trucks and busses, an increase over the preceding week's 93,278 units. With steel output at a high level, the outlook is for increased production in the auto industry, the nation's biggest consumer of steel.

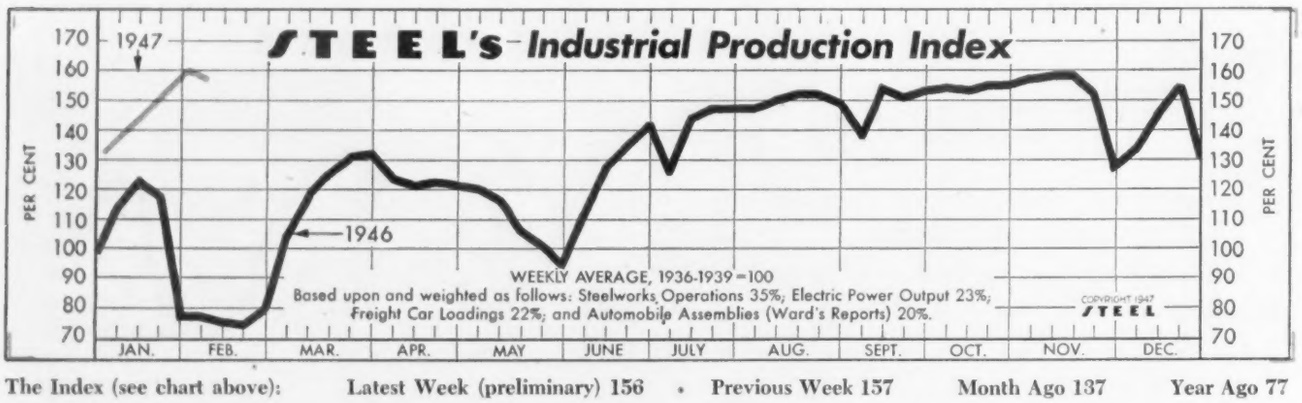
COAL—Production of bituminous coal continues to run well above 13 million tons a week, the estimated output for the week ended Jan. 25 being 13,125,000 tons. This put total production this year 2.9 per cent ahead of that in the corresponding period of last year.

CAR LOADINGS—While railroad car loadings currently are not at the high levels of last fall they are, however, approximately 10 per cent above those a year ago. Incidentally, loadings of grain products in December were the greatest on record for that month owing to large shipments for export.

PRICES—Decreased prices for agricultural commodities, hides and leather brought a decline of 0.4 per cent in primary market prices during the week ended Jan. 25, the U. S. Bureau of Labor Statistics reported. This decline put the bureau's index of commodity prices in primary markets down to 140.3 per cent of the 1926 average of 100, compared with 140.8 in the week ended Jan 18.

INVENTORIES—The dollar value of manufacturers' shipments and inventories continued to rise in December but the increases were smaller than those of recent months, said the U. S. Department of Commerce. Their shipments in December reached a volume of $12.7 billion, and the book value of inventories rose to $20.2 billion. December shipments were about $200 million over November, about a 2 per cent increase. Inventories were valued $300 million above those of November, a rise of about 1.5 per cent.

PRODUCTION—First decline since last May was registered in December by the Federal Reserve Board's industrial production index, the December index being 179 per cent, compared with November's 182 per cent of the 1935-1939 average of 100. The decline was attributed to a temporary reduction in coal production and to holiday influences.



The Index (see chart above): Latest Week (preliminary) 156 • Previous Week 157 Month Ago 137 Year Ago 77

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)‡	92.5	91.5	88	5.5
Electric Power Distributed (million kilowatt hours)	4,777	4,856	4,574	3,983
Bituminous Coal Production (daily av.—1000 tons)	2,187	2,204	1,521	2,087
Petroleum Production (daily av.—1000 bbls.)	4,650	4,672	4,649	4,609
Construction Volume (ENR—Unit $1,000,000)	$94.5	$73.9	$61.9	$70.2
Automobile and Truck Output (Ward's—number units)	95,295	93,278	53,437	29,295

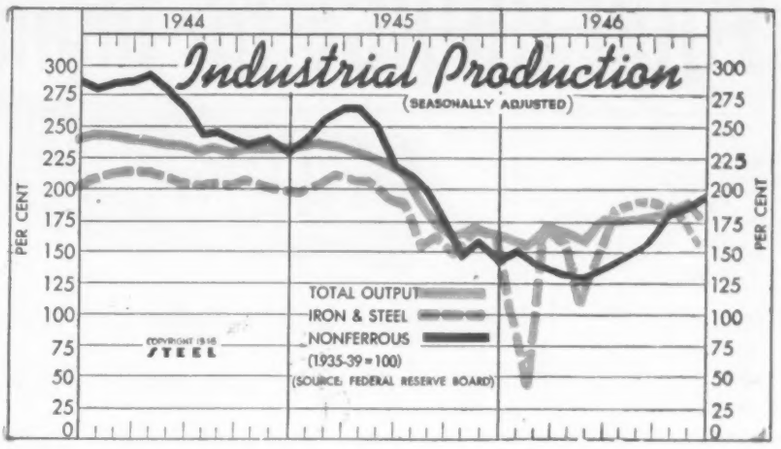
* Dates on request. ‡ 1946 weekly capacity was 1,762,381 net tons.

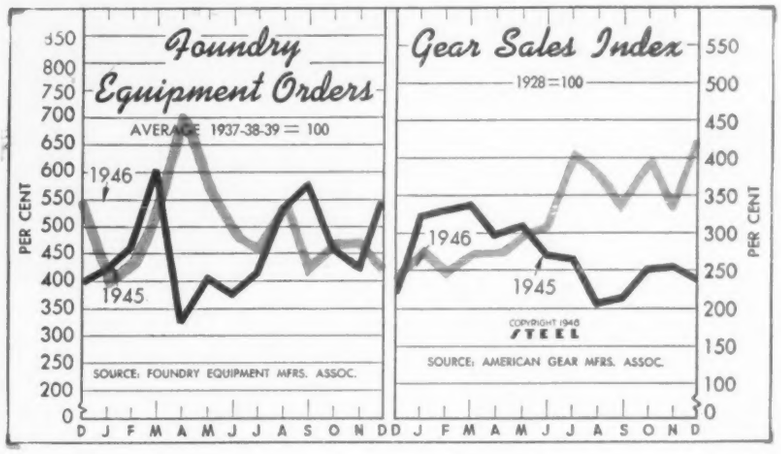
TRADE				
Freight Carloadings (unit—1000 cars)	825†	822	687	723
Business Failures (Dun & Bradstreet, number)	65	52	30	31
Money in Circulation (in millions of dollars)‡	$28,265	$28,369	$28,951	$27,914
Department Store Sales (change from like week a year ago)‡	+17%	+17%	+77%	+17%

† Preliminary. ‡ Federal Reserve Board.

Federal Reserve Board's Production Indexes
(1935-39=100)

	Total Production		Iron, Steel		Nonferrous	
	1946	1945	1946	1945	1946	1945
Jan.	160	234	102	197	151	253
Feb.	152	236	43	202	139	257
Mar.	168	235	169	210	141	267
Apr.	165	230	159	206	132	263
May	159	225	109	204	130	248
June	170	220	154	192	137	219
July	172	210	179	187	148	196
Aug.	177	186	183	155	156	165
Sept.	180	167	184	163	167	139
Oct.	181	162	183	146	179	144
Nov.	182	168	177	167	187	148
Dec.	179	163	158	164	195	147
Ave.	170	203	150	183	155	204

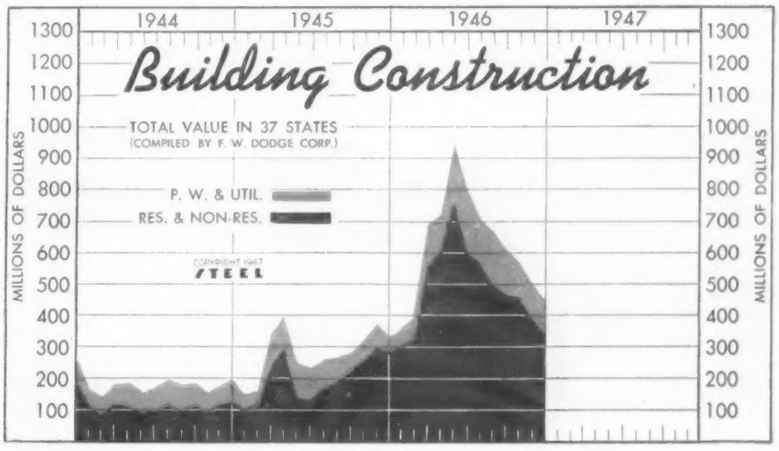



Foundry Equipment Orders
AVERAGE 1937-38-39 = 100
1946
1945
SOURCE: FOUNDRY EQUIPMENT MFRS. ASSOC.
Gear Sales Index
1928=100
1946
1945
SOURCE: AMERICAN GEAR MFRS. ASSOC.
COPYRIGHT 1946 STEEL
PER CENT
D J F M A M J J A S O N D D J F M A M J J A S O N D

	Foundry Equipment Orders Index (1937-38-39=100)			Gear Sales Index (1928=100)		
	1946	1945	1944	1946	1945	1944
Jan.	392.8	422.4	378.3	269	323	246
Feb.	432.8	465.3	456.8	253	331	214
Mar.	536.6	604.7	498.4	275	339	485
Apr.	701.2	325.0	385.7	284	296	308
May	577.3	404.7	503.9	313	309	305
June	491.7	375.4	466.1	321	271	328
July	453.4	411.7	375.8	407	264	242
Aug.	533.7	532.2	450.5	368	205	247
Sept.	424.4	577.2	388.0	342	213	248
Oct.	469.2	457.8	526.5	397	251	293
Nov.	477.4	416.6	369.5	336	255	209
Dec.	430.9	547.6	397.4	425	239	219
Ave.	493.9	461.7	433.1	332	275	279

Construction Valuation in 37 States
(Unit—$1,000,000)

	Total	Public Works-Utilities		Residential and Non-residential	
	1946	1946	1945	1946	1945
Jan.	357.5	50.2	39.8	307.3	101.2
Feb.	387.4	64.7	32.0	322.7	115.0
Mar.	697.6	143.6	90.6	554.0	238.3
Apr.	734.9	128.1	111.9	606.8	283.9
May	952.4	197.9	107.9	754.6	134.6
June	807.9	202.5	95.0	605.5	132.3
July	718.0	153.1	89.9	564.9	167.8
Aug.	679.9	184.4	77.5	495.6	186.1
Sept.	619.9	156.4	54.6	463.5	223.6
Oct.	573.2	112.8	61.1	460.4	255.5
Nov.	503.7	121.8	74.0	382.0	296.0
Dec.	457.3	115.9	51.0	341.4	279.7
Total	7,489.7	1,631.4	885.3	5,858.7	2,414.0



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$12,735	$13,093	$12,212	$11,862
Federal Gross Debt (billions)	$259.9	$259.7	$259.5	$279.2
Bond Volume, NYSE (millions)	$31.3	$22.2	$33.6	$34.6
Stocks Sales, NYSE (thousands)	7,033	4,426	5,157	12,921
Loans and Investments (billions)†	$56.0	$56.1	$56.2	$68.1
United States Gov't. Obligations Held (millions)†	$36,171	$36,231	$35,837	$49,531

† Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$69.36	$69.36	$67.91	$58.27
All Commodities†	140.3	140.8	139.6	106.8
Industrial Raw Materials†	152.1	153.3	154.2	119.0
Manufactured Products†	136.0	136.4	134.5	102.9

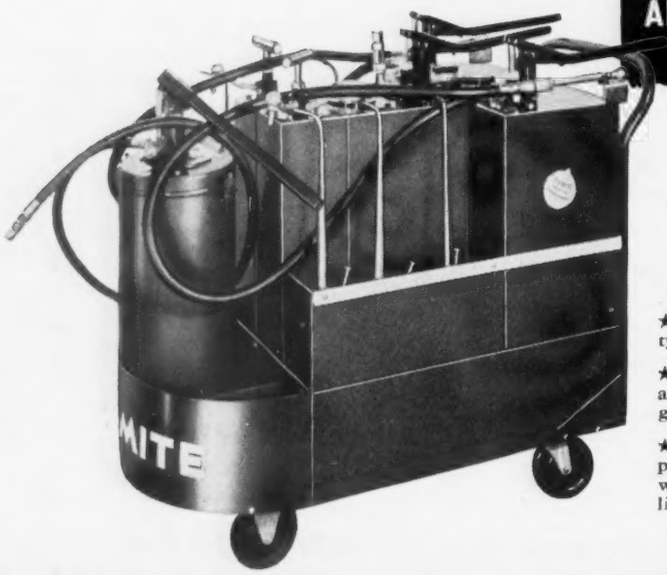
† Bureau of Labor Statistics Index, 1926=100.

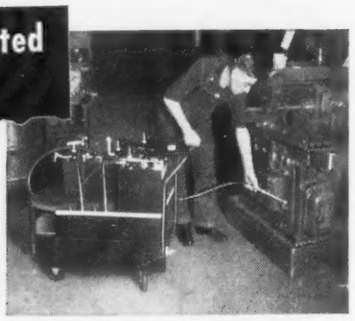
YOUR CHOICE for Immediate Delivery!

COMPLETE LUBRICATION DEPARTMENTS ON WHEELS

Alemite LubriKarts Make the Transferring, Handling and Application of Lubricants a Quick, Clean, Easy Job

Alemite Hand-Operated LUBRIKART





QUICK FACTS

★ Equipped for handling 6 types of greases and oils.

★ Storage capacity for as many as 6 lever-type or push type guns, adapters, tools, waste, etc.

★ Carries 30-lb. capacity high pressure portable grease pump with 5½ ft. hose and hydraulic coupler.

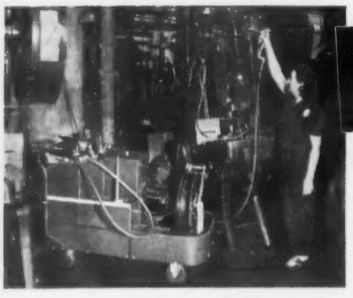
★ Equipped with six 1-quart hand oil cans.

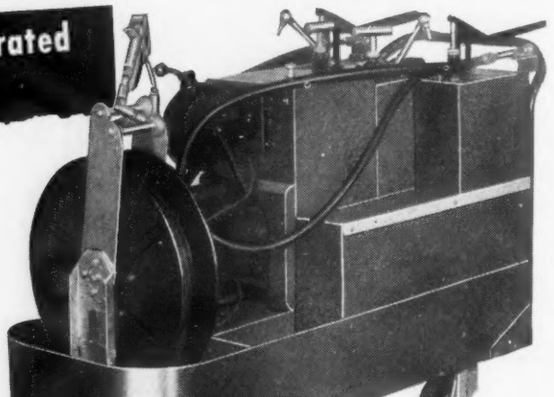
★ Five individually operated grease and oil pumps.

★ Three 7 gallon tanks—two 1¾ gallon tanks.

★ Complete unit, 44″ long x 21″ wide x 37½″ high, wine colored, baked enamel finish.

Alemite Electric-Operated LUBRIKART





QUICK FACTS

★ Equipped for handling 5 types of greases and oils.

★ Added advantage of a built-in, high pressure, electric power gun.

★ 20 ft. high pressure lubricant hose mounted on spring return reel.

★ Comes equipped with six 1-qt. hand oil cans.

★ Four hand operated grease and oil pumps.

★ Two 1¾ gal. and two 7 gal. tanks.

★ Storage capacity for as many as six lever-type or push-type hand guns, adapters, tools, waste or wiping cloths, etc.

★ Complete unit 55¼″ long x 21″ wide x 39″ high, finished in wine baked enamel.

STEWART WARNER

ALEMITE

Alemite ALONE Combines all 3 in Lubrication

1. EQUIPMENT 2. PROCEDURES 3. LUBRICANTS

ALEMITE, 1879 Diversey Parkway, Chicago 14, Illinois

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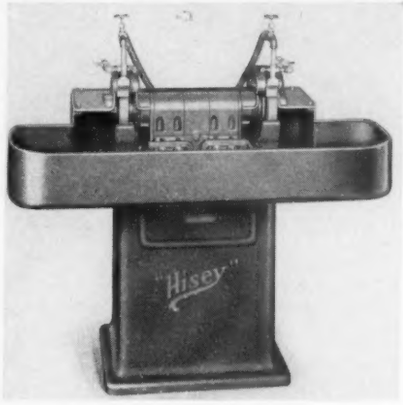
New Products and Equipment



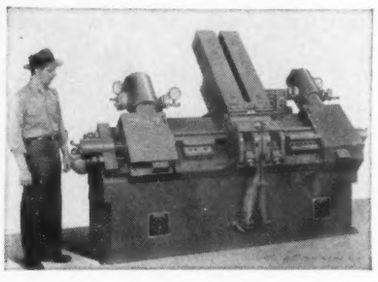
1. Wet Grinders

Grinders in sizes for 10, 12, 14, 18, 20, 24 and 30 in. grinding wheels are being manufactured by Hisey-Wolf Machine Co., Cincinnati 25. Illustration shows double-end model although machines are built with one grinding wheel only—also in a combination wet and dry model with one wheel for dry operation and the other for wet grinding.

Motor is mounted on rear of pedestal with V-belt drive to spindle. Pump is of self-priming type with individual control valve for each wheel.

2. Flash Welding Equipment

New line of flash-welding equipment announced by Sciaky Bros., Chicago, includes welders which range in size from 75 kva for 0.90 sq in. mild steel up to large, completely automatic machines rated 500 kva for capacities up to 5 sq in.



Included are mitre joint welders for improved production of steel and aluminum window frames, door sash etc. Flashing and upsetting on smaller welders is by means of a hand lever. Large welders are either all power-operated, or a combination of hand lever flashing and power upsetting.

Frames are designed as a self-contained beam with conductors from transformer to dies outside the frame. Platens move on a wide, rigid T-shaped bed with a narrow guiding key. Clamps are actuated by hydraulic system. On the large power-operated machines, flashing and upsetting is independently controlled. Both platens are moved by an air cylinder driving a wedge-shaped cam between rollers. When welding tubes over 3 in. OD a dual transformer supplies heat to both upper and lower dies.

3. Electronic Counter

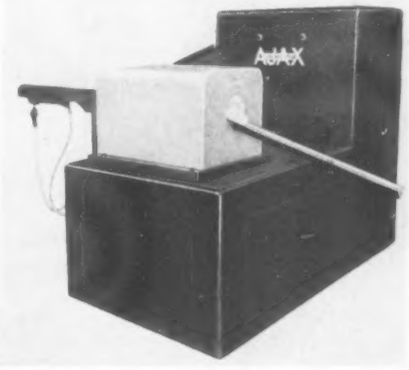
Designed for high speed counting, batching and packaging of processed items, the single channel predetermined counter model 140, manufactured by

Potter Instrument Co., 136-56 Roosevelt avenue, Flushing, N. Y., counts and controls at rates of 15,000 per minute and higher if required. The desired count is initially set up by dial switches located on front panel of instrument. When predetermined number of items are counted, unit actuates a control which is used to automatically stop or divert flow of materials. Counter can be set to recycle automatically, or manually by means of a remote control switch. When automatic reset is used the instrument will reset in 2 milliseconds.

Unit utilizes four standard Potter 4-tube counter decades which are arranged to permit use of any predetermined number from 0 to 10,000. Other models provide separate predetermined channels for the control of two-step sequential processes.

4. Induction Heater

Designed for continuous, automatic heating of steel slugs or forging blanks prior to forging operations, a new induction heater which ejects a white-hot



slug every few seconds is announced by Ajax Electrothermic Corp., Trenton 5, N. J. Cold slugs, loaded into a roller type chute on the left side of the heater, are fed in a continuous succession through the horizontal heating coil by a pneumatic ram, and drop out at other end of coil into a chute or tongs, ready to be placed in forging dies.

Each slug is uniformly heated to about 2200° F, the power source being a 200 kw motor-generator set, operating at about 1000 cps. Heater can be converted from one job to another by changing the heating coil, resetting the timing device and adjusting the feeding chute. Easy-to-service housing of the continuous

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heater contains all capacitors and controls in one compact unit.

5. Small Knee Type Miller

Designed for use by manufacturers of small parts, tool and die shops, instrument makers, etc., the No. 0000 knee type milling machine, illustrated here, manufactured by Childs & Co., 208 16th

street, Conneaut, O., is 14½-in. high. It is suitable for bench or table operation, or with a pedestal, as a floor type miller.

Longitudinal feed of the miller is 6 in., vertical, 4 in., and transverse, 1½-in. Movement of table in the three directions is held to 0.001-in. in accuracy and 0.0001-in. tolerance applies to run out of spindle. Countershaft and jackshaft, driven by double V-belt drive which comes up through the column, provides nine speed changes. Countershaft assembly provides speeds from 280 to 11,150 rpm.

6. Boring Bar Set

Boring bar set and holder kit is announced by Brunc Tools, Beverly Hills, Calif. Designated as No. 650, the kit consists of an adjustable boring bar holder No. 600 and boring bar set No. 559.

Boring bar holder has a capacity of 3/16 to 3/4-in. Its V-channel grip securely grips round, hex, square and out-of-shape bars as well as drills, reamers and chucks without the use of adaptors, bushings, or attachments, always holding bar or tool on exact center. The holder is easily installed on any 9 or 10 in. swing lathe. Centering height is 1 3/16-in.

Boring bar set consists of ¼, ⅜ and ½-in. boring bars, each with lever-lock grip which clamps the bit with equal pressure along the entire holding channel and the full diameter of the bar. Each bar has one precision ground high speed steel threading bit and one blank high speed steel bit.

7. Moisture Meter

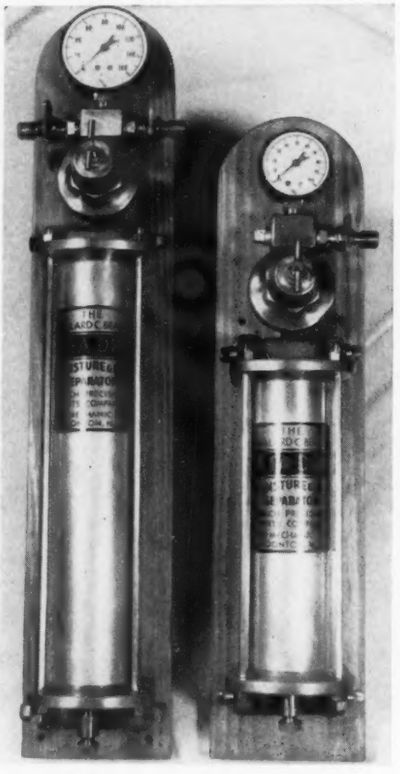
As many as fifteen readings per minute may be made with the meter for determining moisture in foundry sands, announced by J. Thomas Rhamstine, Harlingen, Tex. Readings are accurate to

within one-quarter of one per cent, recording the percentages on a 4 in. dial graduated from 0 to 6.

Two separate systems are incorporated in the instrument. One where, with certain types of sands, the meter may be used without being attached to alternating current power lines. The second system is amplification of the primary readings, where the control may be used to set the meter needle to correspond at the scale figures. A prod or pick-up is supplied for inserting in the sand to obtain a reading. A special pick-up may be designed for use with conveyor installations.

8. Air Drying Unit

Capable of delivering clean dry air with a minimum of frictional line drop, the Sta-Dri air conditioning unit, built by Beach Precision Parts Co., 120 Mechanic street, Boonton, N. J., screens out scale,



rust and dirt from compressed air pipe lines. Model A-1 will handle approximately 30 cu ft of air per minute at 100 lb pressure, while model A-2 will handle about 65 cu ft at the same pressure. Units also extract moisture and oil fumes, regulate air pressure to any desired lower level and gage final pressure used on a dial. Both models are panel mounted for convenient installation. Filter elements are replaceable.

9. Dust Collector

Portable dust collectors built by Dust Filter Co., 1753 West Lake street, Chicago 12, utilize a new principle which causes the separation of high percentage of the dust at the point of intake. A designed baffle plate located beneath the filter tubes causes a rotation of air and dust in a cyclone manner into the retaining pan at the bottom of the unit depositing dust at that point before it has an opportunity to reach the filter tubes. Consequently, no heavy dust or

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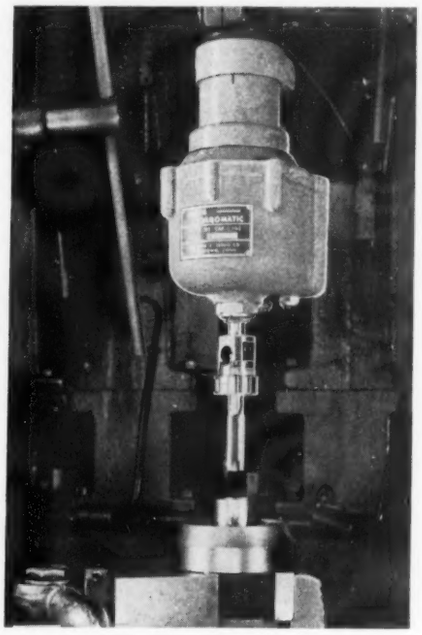
lint reaches the fifteen 36 in. long filter tubes at the top of the unit. All remaining fine dust is collected in the tubes. A static pressure of 6½-in. is maintained constantly. Each collector is 4 ft high and approximately 2 ft square. It is equipped with a 1½ hp 3 phase 220-440 v motor and can handle two 4 in. branch pipes.

10. Tapping Attachment

Charles L. Jarvis Co., Middletown, Conn., announces the Torquematic, a universally adaptable torque-driven tapping attachment. Available in three sizes, it will tap from soap to copper or chrome



nickel steel without an appreciable increase of the finger-tip pressure required to operate an ordinary drill press. Attachments come in standard and built-in models, and can be furnished to fit any drill press or tapping machine.

11. Carbon Monoxide Alarm

Carbon monoxide alarm, designed for protection against dangerous concentrations of carbon monoxide in the air, around blast furnaces, in steel mills and chemical plants, is being manufactured by Mine Safety Appliances Co., Pittsburgh. It operates continuously, giving both visible and audible warning when carbon monoxide concentration in air reaches a predetermined level. Predetermined settings can be made for concentrations as low as 0.02 per cent—a point at which a few hours exposure would be required to produce the first symptoms of carbon monoxide poisoning.

Alarm draws a continuous sample of surrounding air and forces it over a cata-

lyst which oxidizes all carbon monoxide to carbon dioxide. The heat of reaction is measured by thermocouples and indicated on a contacting meter dial in terms of carbon monoxide concentration. When the concentration reaches the predetermined meter setting, an alarm horn sounds and a red light jewel is illuminated. Both signals continue to operate until the instrument is manually reset.

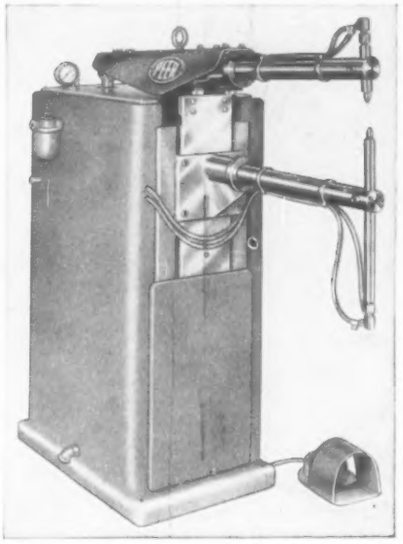
12. Leather V-Belting

Notched leather V-belting with ends connected with a roller chain link between two bails, shaped in a half circle and bolted to the ends, is announced by S. R. Sikes Co., 150 North Wacker drive, Chicago 6. When the belt takes the arc of the pulley, the roller rides around on the bail the same as it does in riding the sprocket of a pulley. Wear is taken between link pin and roller.

Belting is made in two series to fit every V-belt drive carrying standard 40-degree angle sheaves. One series of sizes, lettered A, B, C, D, etc., is for all heavy industrial machinery. The numbered series is for light machinery using small diameter pulleys, such as electric bench tools. It is sold in 100-ft boxes, clamps extra, to fit each belt size. Remnants of belts may be fastened together into one belt, eliminating waste.

13. Spot Welder

A series of high speed, fully automatic air-operated, rocker arm, spot welders is announced by Pier Equipment Mfg. Co., Benton Harbor, Mich. The welders



designated the A-200 series, incorporate a double acting air cylinder of ample size to provide the high electrode pressure essential for consistent high production of quality welds. Rocker arm is mounted on roller bearings, and hammering of the electrodes is minimized by the light weight welded steel construction of the rocker arm assembly.

Minimum obstruction on front of welder and around rocker arm assembly facilitates handling of large or irregular-

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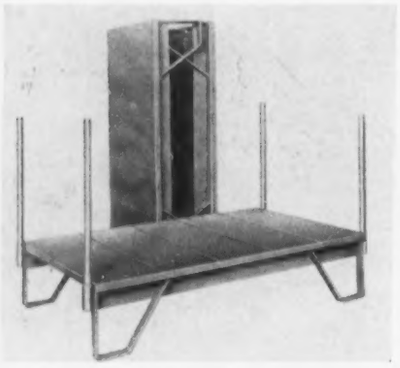
shaped parts, and electrical design provides a lower power demand for a given welding job. Standard equipment includes foot switch control, air pressure regulator, universal horns, water-cooled electrode holders and one set each of straight and offset copper alloy welding points. Welder capacities are 10 and 15 kva with throat depths of 8, 12, 18, 24 and 30 in.

14. Skid Platform

Market Forge Co., Everett, Mass., is manufacturing an all-steel skid platform for use with hand and electric lift trucks. Made in any size and for any lift truck,



its deck panels are of medium gage high-tensile strength steel. Panels are securely welded to Z bars which are the actual load-carrying members, with solid steel bars forming the legs. A continuous platform is provided, gaps between panels being eliminated. Distinctive legs allow platforms to be stacked on end when empty by a single operator. Edges of platform are smooth. Platforms are built with integrally welded corner stack sockets, if desired.

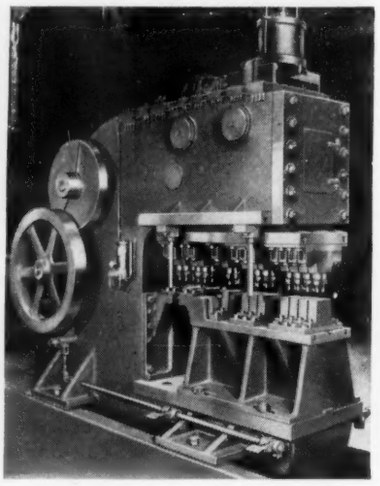
15. Solenoid Valve

Henry Valve Co., 3260 West Grand avenue, Chicago 51, announces a type SV-11 solenoid valve designed for small capacity installations involving the use of freon, methyl chloride, water, air, oil, gas, etc. Incorporated in a standard outlet box, it can be quickly mounted and electrically connected. Coil can be removed and replaced without disturbing electrical connections to thermostat or other electrical devices.

Magnetic circuit provides low current consumption and "floating plunger" insures quiet operation. It is furnished with connections in following standard voltages: 115 v, 60 cycle, and 230 v, 60 cycle. It can also be mounted in approved metal enclosure, less outlet box.

16. Toggle Machine

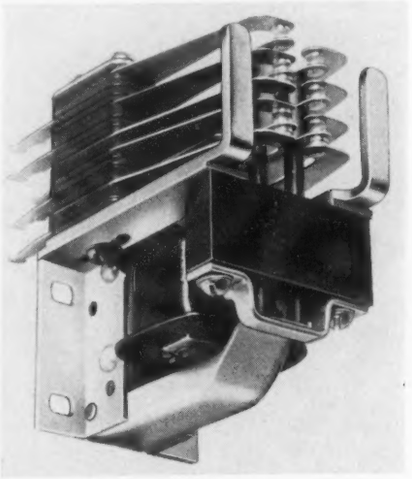
Designed to handle a wide range of structural steel shapes and sections for both flange and web punching in one handling, a size 12 toggle machine, announced by Beatty Machine & Mfg. Co., Hammond, Ind., occupies a small floor area. Special tools for a wide variety of punching requirements may be applied to the machine. Die space may be modified if wider ram face is required. Punching tools with die holders provide two diameters on each pitch line, saving time and eliminating rehandling.



Some of the machine's specifications are as follows: Face of slide, right to left, 12½-in.; face of slide, front to back, 48 in.; die space, 36 in.; stroke, 1¾-in.; throat, 25 in.; front of table, front to back, 49 in.; face of table, right to left, 22 in. and capacity 137 tons.

17. Control Relay

An alternating current relay, developed by Automatic Signal Division, Eastern Industries Inc., East Norwalk, Conn., for vehicle-actuated traffic control sys-



tems, stands up under duty as high as 10,000,000 operations per year. A circuit closure of as little as 0.010-sec operates the relay. Also as many as 10 individual pairs of contacts can be accommodated on each relay.

Each contact spring is encased in phenolic insulation to give high insulation resistance. Coils for 115, 60 cycles, and 12, 60 cycles, and pure silver contacts 5/32-in. diameter (rated 5 amp 115 v ac non-inductive) and 7/32-in. diameter (rated 10 amp 115 v ac non-inductive) are standard. Other contacts and coils can be supplied.

18. Selective Speed Drives

Marketed under the name Power-Flo, selective speed drives and speed reducers manufactured by Speed-Drives Inc., 23215 Hoover road, East Detroit, Mich., have four speeds with ratios 1:1, 1¾:1, 3:1 and 4:1. Each model includes brackets for all types of machine tools including automatic screw machines, agitators, conveyors, mixers and rollers. Drives are available in sizes of ½ to 20 hp.

All have hardened and ground gears and shafts, antifriction bearings, position-locked shaft end-play control, leak-proof oil seals, splash bath lubrication, and combined right and left hand power take-off. Design of shifting mechanism insures full mesh of gears in each position.

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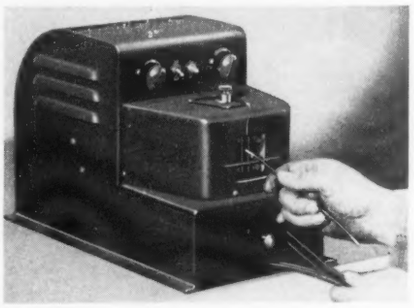
Rigid machine-fitted guide rods and wide bearing surfaces hold bronze shifting fingers in position under all conditions. Bell end mounting positions permit drive to be mounted on bottom, top, front or back without changing upright position of case or shifting arm.

19. Wire Stripper

Two electrically heated blades perform the insulation stripping operations of the Hot Blade wire stripper, illustrated here, developed by Ideal Industries Inc., 1921 Park avenue, Sycamore, Ill. There is no possibility of cutting or injuring either solid or fine stranded wire, as the blades are blunt.

Wire is inserted between blades which instantly burn two parallel grooves



through the insulation. A slight twist completes the groove and a pull removes the insulation. A built-in exhaust draws smoke and fumes of burning insulation away from blades. Strippings fall into a water drawer where any burning particles are extinguished. Control is provided for adjustment of heat for different types of insulation. Blades may be set at exact wire diameters. Stripper is foot pedal operated.

20. Shell End Mills

Vascoloy-Ramet Corp., North Chicago, Ill., anounces a line of Red Streak carbide tipped and Blue Streak Tantung tipped shell end mills, manufactured in right and left hand styles, ranging in size from 2½ to 4½-in. OD and bores 1 to 1½-in. Carbide tipped shell end mills are available with negative radial and axial rake angles for milling steel and zero rakes for milling cast iron, nonferrous and nonmetallic materials.

21. Gravity Drop Hammer

Chambersburg Engineering Co., Chambersburg, Pa., announces a new gravity drop hammer, the Ceco-Drop, which utilizes air or steam to raise the ram. A simple clamp holds ram and rod at the top of the stroke. the clamp being released by means of an air valve actuated by the operator's foot treadle.

Because of its speed, the hammer forges metal at higher temperatures and forgings are better matched through the use of parallel, integral guides (electronically hardened), heavier frames, and a low center of gravity which insures against movement and vibration. Use of this hammer eliminates much of the usual down-time. There is no friction to adjust and the stroke can be changed in a matter of seconds by means of a rocker arm with adjustable dogs. Ham-

mer has fewer parts, none of which overhang the operator.

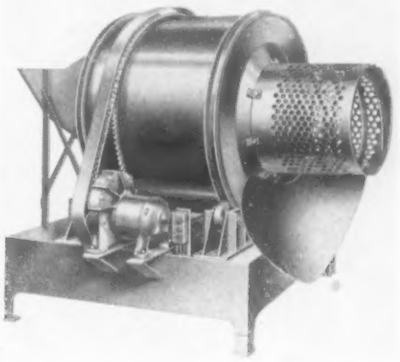
A safety cylinder cover eliminates the broken rod hazard. Feeding and working zone of hammer is clear and free due to elimination of the front rod and its appurtenances. Rated sizes of the Ceco-Drop are from 50 to 20,000 lb.

22. Tumbling Machine

Two-direction tumbling machines for rapidly deburring metal products are announced by Barber Tumbling Machine Works, Oak Park, Ill. While in continuous flow operation, load units pile up in cylinder's midsection. Load lifters give a rise and fall tumbling to all material at all times, while the cylinder is constantly receiving and discharging load pieces. Pieces are subjected to both rotational and axial tumbling actions, severest on pieces passing through the heap in the cylinder's midsection.

Model 4B tumbling machine is a continuous flow machine which allows pieces to pass through in 5 to 8 min, depending upon stream volume. A tilting gear facilitates unloading. Gear's operating screw holds cylinder at any angle for tumbling different load materials. Machine is hopper fed and available in two sizes with capacities for 20 to 30 tons of average stampings daily.

Model 8 machine, illustrated, operates under the same principle, with a geared



motor and chain drive revolving the drum on roller bearing rollers. It operates with no manual effort required other than pushing button to stop and start. This model available in three standard sizes for tumbling 2¾, 4½ and 6½-cu ft loads.

23. Hand Vise

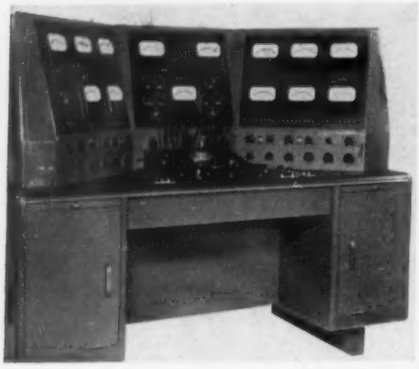
Handling of small parts and pieces is made easier and safer for both bench and production jobs by an aluminum hand vise developed by Chicago Tool & Engineering Co., 8383 South Chicago avenue, Chicago 17. It grips solidly, yet will not mar or scratch the work. The 1½ in. wide vise jaw faces, which open to 1½ in. are accurately machined to provide a true surface. Known as the Palmgren No. 15 hand vise, it can be used by tool and die makers, metal and wood workers, machine manufacturers, repair workshops and others handling any small pieces. The vise is only 5 in. long and weighs 7 oz.

24. Vacuum Tube Test Set

Vacuum tube bridge characteristic test set designed to reduce operator fatigue and eliminate personal errors resulting from circuit arrangement, is announced by Sylvania Electric Products Inc., 500 Fifth avenue, New York 18. The console unit includes bridge and auxiliary switch gear mounted on the control shelf; electronically regulated power channels; bridge signal source; amplifier; meters and other accessories. All meters except those for gas and heater cathode current are located on sloping panels.

Operating from a 1500 w, 220 v, 3-

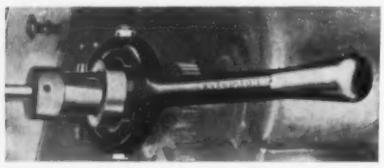
phase, 60 cycle ac source, the unit will provide 0-600 v, 100 ma supply for plate and screen grid; 0-300 v, 100 ma for auxiliary and heater cathode; 0-300 v, 400 ma for emission; and 0-100 v, 2 ma for bias. A reverse polarity switch is



provided for heater supply which can also be used as a second auxiliary. Filament supplies include 0-128 v, ac, 100 va; 8 v dc, 5 amp, 35 v dc, 2 amp; and 128 v dc, 1 amp.

25. Lever-Type Drawbar

Designed for production use on ½-in. collet lathes, such as the Atlas, Logan and South Bend, the lever type drawbar, illustrated here, made by General Die & Stamping Co., 262-272 Mott street, New York 12, provides ease of operation espe-



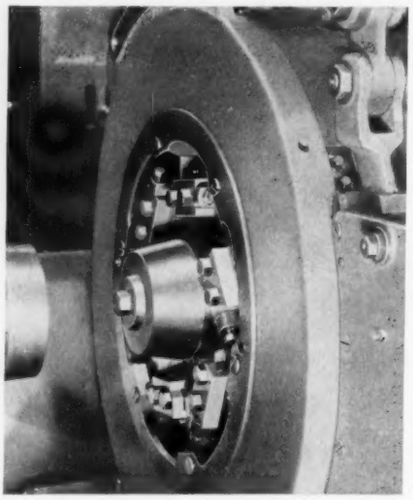
cially where there is a slight variation in work diameter. It features three positions of tension adustment.

The drawbar automatically adjusts itself to the diameter of the stock. There is no chatter from the rigid attachment and high leverage reduces operator fatigue. Unit employs co-ordinate cam principle which reduces friction to a minimum and eliminates the need for fingers.

26. Centering Pilot

Centering pilot developed by Landis Machine Co., Waynesboro, Pa., is designed for their 8⅝ and 13⅜-in. receding chaser pipe threading and cutting-off machines. Spring pilot is bolted onto rear of cross rail, necessitating the removal of the cutting off slides and limiting machine to threading only when equipped with the pilot. Since the pilot forms a center in bore of die head for centering pipe with the die head, only the rear chuck of machine is used to grip the pipe during the threading operation.

In operation, pilot is forced forward by a spring and engages bore of pipe prior to pipe advancing to the chasers. The spring forces at rear of pilot are taken up by an antifriction bearing. The 10-



degree angle of the pilot permits its use on different wall thickness of pipe. When pilot is changed for different diameters of pipe it is only necessary to remove one screw in center of the pilot.

27. Tool Dressing Fixture

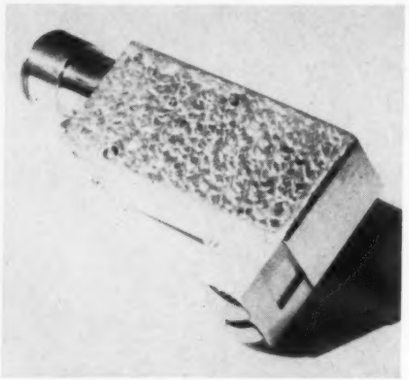
Allied Machinists, 6 Water street, Waltham, Mass., is manufacturing a Gem-Flex wheel and tool dressing fixture which is equipped with vise, diamond

holder, Allen wrench, ½-in. straight-shank center and handle to facilitate wheel dressing. It will form any angle in addition to a number of inside and outside radii, as well as forming tool bits, small dies and thread chasers. Equipment will handle drilling and light milling work and, when used as a surface gage, circles or chords of circles can be scribed in either vertical or horizontal planes. It can also be used for backing off reamers and cutters.

Its first and second standards are held in place with ball bearings. Vise capacity is 1¼-in., degree markings are etched plainly and all binding screws are brass tipped for smoother tension action and better locking qualities. Tool bit slots are 3/16, 1/4, 5/16, 3/8 and 7/16-in.

28. Profilometer Tracer

Self-adjusting and hand-operated, the new type MA Profilometer tracer introduced by Physicists Research Co., Ann Arbor, Mich., replaces the type M tracer



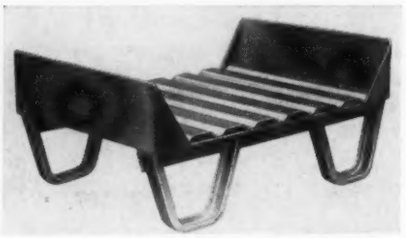
as standard equipment with all Profilometers.

Hand operation is an important feature because of its efficiency. Operation consists merely of placing the tracer on the surface, moving it to and fro, and noting the microinch reading.

The unit is also considerably smaller than the old type as it will go completely through a 1½-in. ID opening. Only two skid yokes are needed to handle all surfaces and no adaptations are needed to use it with any Profilometer now in use.

29. Skid Platform

Made to withstand the severest usage in handling heavy castings, scrap and all types of industrial products, the Phil-Skid platform, illustrated here, built by Phillips



Mine & Mill Supply Co., 2227 Jane street, Pittsburgh, is of all-welded steel construction with heavy corrugated steel deck. Three-inch channel legs of 3/16-in. plate eliminate possibility of load tipping. Platforms are made in desired sizes for use with any type lift truck.

Helpful Literature

50. Oil Filters

Briggs Filtration Co.—Series of four illustrated filable loose-leaf bulletins describes models SV2, D, D-1, DF and JD oil filters. Construction, specifications, dimensions, capacities and replacement filters are listed.

51. Protective Clothing

B. F. Goodrich Co.—10-page illustrated booklet No. 12000 presents data on new equipment in protective clothing field. Functions of equipment are described and method of construction and materials used are listed.

52. Die Casting

Doehler-Jarvis Corp.—30-page illustrated catalog "Successful Die Casting" presents details of manufacturing facilities and geographical location of plants to serve industrial organizations.

53. Hydraulic Motors

Denison Engineering Co.—12-page illustrated catalog No. FM-1 describes line of series 1000 HydroOILic fluid motors for application where shock load operations and conditions do not permit use of conventional motors. Diagrams show oil flow and mounting methods.

54. Arc Welding Electrodes

Alloy Rods Co.—40-page illustrated catalog is entitled "Alloy Arc Welding Electrodes". Described is company's complete line of alloy electrodes and included are complete technical data on variety of subjects such as welding procedure, physical properties, metallurgy, deposit characteristics, etc.

55. Furnace Lining

Cleveland Quarries Co.—22-page illustrated bulletin No. 15-B outlines uses of Buckeye Silica Firestone in soaking pits, Bessemer converters, blast furnace ladles, mixers, gray iron cupolas, foundry crane ladles, malleable furnaces, drop forge furnaces and in other refractory application.

56. Cylindrical Grinders

Norton Co.—8-page illustrated broadside is descriptive of type C Norton cylindrical grinders which are available in 4, 6, 10, 14 and 16-inch sizes. Brief specifications are given for each size of these precision, high production machines. Also shown are typical models in Norton line of grinders and lappers.

57. Stainless Steel Chart

Crucible Steel Co. of America—Folding data chart "Characteristics of Rezistal Stainless Steels" lists types analysis, predominant structure, density, modulus of elasticity, specific heat, thermal conductivity, expansion, melting point, electrical properties, heat treatment, mechanical properties and hardness of Rezistal stainless steels.

58. Machine Tools

Crozier Machine Tool Co.—12-page illustrated catalog describes features and operation of Time-Saving tools and various models of Vacuum-Grip speed lathes for odd shaped parts. Tool post turrets equipped with cutting-off tool and holder and collet attachments are covered.

59. Capacitor Starter Motors

Emerson Electric Mfg. Co.—4-page illustrated folder No. X5526 outlines details of construction, dimensions and rating standards of complete line of electric capacitor starter motors. Motors range from 1/8 to 3/4-horsepower in size.

60. Industrial Lift Truck

Automatic Transportation Co.—8-page illustrated folder presents information about transtacker electric-hydraulic lift truck for moving, lifting and stacking loads up to 4000 pounds. Specifications and dimensional data are given on four models.

61. Cold Forged Parts

John Hassall, Inc.—48-page illustrated catalog No. 50 describes and shows typical samples of wide range of cold forged parts. Nail points and heads in both standard and special sizes are covered. Other parts described include escutcheon pins, special rivets, standard long and short rivets, annular threaded screws, drive screws, fluted and knurled parts, machine screws, and special parts.

62. Industrial Truck Battery

Philco Corp., Storage Battery Div.—4-page illustrated bulletin No. BD-638 discusses design, construction and features of Philco 30 lead-acid storage batteries for powering electric industrial trucks. Capacities range up to 880 ampere-hours.

63. Safety Helmets

Mine Safety Appliances Co.—4-page illustrated bulletin No. DK-13 gives details of wide variety of Skullgards which provide protection against head hazards in industry. Shapes and styles for use in construction, oil field, steel mills, mines, etc. are shown.

64. Oil Hardening Steel

Kloster Steel Corp.—4-page illustrated bulletin on Swed-Oil nonshrinking steel covers features, machining, uses, heat treatment procedure and properties of this oil hardening steel which is available from stock in over 400 sizes of rounds, flats and squares.

65. Drafting Material

Eastman Kodak Co., Industrial Sales Div.—4-page illustrated pamphlet "Kodatrace" covers translucent tracing material that can be used as original for photographic printing or as overlay in commercial art field. Kodatrace material is made of safety base film tinted blue. Surface is fine grained matte and erasures in pencil or ink can be made.

66. Industrial Heat Lamps

General Electric Co.—6-page illustrated folder No. Y-689 consists of descriptions and technical data in industrial heat lamps. Application of lamps for heating, drying and baking processes are listed. Four main types of ovens used to employ infrared lamps are covered.

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67. Oxygen Electric Cutting

Arcos Corp.—4-page illustrated bulletin No. 1146-CP describes Oxyarc process for hand cutting or piercing stainless and stainless clad steel, alloy steel, aluminum, brasses and bronzes, cast iron, Monel, Inconel and nickel. Process employs combination of electric arc and stream of oxygen.

68. Dilation Meter

Bristol Co.—6-page illustrated bulletin No. W-1803 describes model A-134 Dilatometer direct reading instrument which records temperature-dilation changes and temperature-time changes simultaneously during heating and cooling cycles of ferrous and nonferrous metals, ceramics and other materials in solid form.

69. Power Belt Conveyor

Rapids-Standard Co.—32-page illustrated catalog No. 31-C5 presents specifications and application information on line of Rapid Power Booster conveyors which facilitate materials handling. Typical uses of various styles of belt conveyors in many industries are shown. Both portable and permanent types are described.

70. Springs

Accurate Spring Mfg. Co.—36-page "Handbook of Technical Data on Springs", third edition, offers clear, concise data on design formulation, load deflection and proper methods of specifying springs. Helpful short cuts for making spring calculations are presented.

71. Hose Couplings

Kelly Machinery Co.—6-page illustrated catalog No. 112 gives specifications of line of universal type quick detachable pneumatic hose couplings, clamps, menders and nipples. Also included is 8-page folder which lists dimensions and shows typical air hose fittings.

72. Decimal Equivalents

John Hassall, Inc.—15 x 28-inch wall chart of decimal equivalents is accurate to four places. Decimal equivalents are given in increments of 1/64-inch for all fractions from 1/64 to 1 inch inclusive. Figures are large enough for easy reading. Also shown are typical cold forged parts which include nails, rivets and screws in standard and special types.

73. Industrial Truck Safety

Associated Factory Mutual Fire Insurance Cos.—4-page publication No. 11.24 entitled "Industrial Trucks and Tractors—Fire Hazards" discusses safe operation; recommended limitations of use; approved types and standards; collision with piping; and operation and maintenance of battery powered and gasoline powered trucks.

74. Furnace & Mill Equipment

Edgar E. Brosius Co.—16-page illustrated catalog "Designers and Manufacturers of Special Equipment" presents details of company's line of auto floor charging machines, manipulators, overhead chargers, mechanical clay guns, buckets and soaking pit cover carriages.

75. Metal Turnings Crusher

American Pulverizer Co.—8-page illustrated bulletin describes American Ring metal turnings crushers. Cutaway illustrations, dimensional data, general specifications and typical installations are shown. Advantages of handling crushed turnings are outlined.

76. High Conductivity Alloy

Ampco Metal, Inc.—4-page illustrated bulletin No. 81 presents data on Ampcoloy 90 alloy developed to produce copper castings with minimum electrical conductivity of 90 per cent. Chemical analysis and physical properties are covered.

77. Electric Motors

Brown-Brockmeyer Co.—6-page illustrated bulletin No. 5000 presents data on line of industrial electric repulsion start, polyphase squirrel cage, split phase and sump pump variable speed motors in sizes from 1/8 to 30 horsepower.

78. Die Steels

Latrobe Electric Steel Co.—12-page illustrated booklet "Latrobe Desegatized Die Steels" describes properties and applications of Select B air hardening, Cobalt Chrome air hardening, G.S.N. oil hardening and Olympic air hardening steels.

79. Dehumidifying Apparatus

Pittsburgh Lectrodryer Corp.—36-page illustrated bulletin No. 105 describes principle and applications of Lectrodryer equipment for controlling water vapor, Lectrebreather for preventing entrance of moisture into storage tanks and Lectrofilters for removing oil vapor from compressed air or gases. Typical applications are described.

80. Dust Collectors

Peters-Dalton Inc.—16-page illustrated technical bulletin No. 101 describes Hydro-Whirl rotor, pump and orifice type dust collectors suitable for individual applications or in large battery type units for central systems. Applications include buffing, grinding and trimming operations, molding and foundry work and other industrial installations.

81. Milling Machines

Kearney & Trecker Corp.—4-page illustrated bulletin presents detailed information on new series of knee type CSM milling machines which includes vertical and horizontal design. Amply powered for carbide milling of steel, these machines will handle standard milling operations as well.

82. Motorized Hand Truck

Lift Trucks, Inc.—6-page illustrated bulletin gives details of motorized HydroLectric lift truck. This power driven hydraulic lift truck has capacity of 4000 pounds. All controls are located conveniently in handle which is balanced for ease in manipulation and steering.

83. Indicating-Control Systems

Allis-Chalmers Mfg. Co.—12-page illustrated engineering bulletin No. 14B6641 describes remote indicating and control systems. Applications include remote control of valves, rheostats, potentiometers, governors, switching devices and combination sequence controls as well as indicating and signaling systems.

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Electric Stroke Indicator and Push-button Control Panel—Motor-Driven Stroke Adjustment are standard equipment on this model.

The 250 ton, 2 point Eccentric Gear Gap-Frame Press shown is of all-steel Danlyweld construction. Gearing and driving members are completely enclosed within the frame. This press has a 14" stroke—operates at 20 strokes per minute. Bed area is 32"x84". Shut height—54".

THE PRESS for MODERN PRODUCTION

DANLY MACHINE SPECIALTIES, INC., 2100 South 52nd Avenue Chicago 50, Illinois

Cold Wave Cuts Operations Of Metalworking Plants

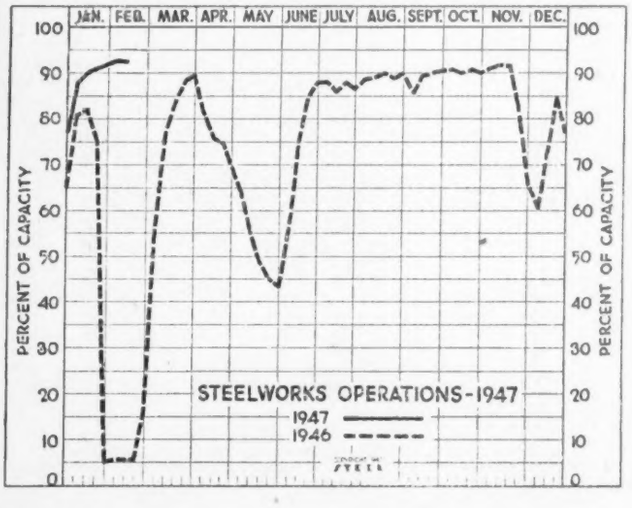
Some steel plants forced to shut down completely or at least curtail activity in certain departments . . . Freight car program requires shipments of 165,000 to 175,000 tons monthly beginning in April

OPERATIONS of metalworking companies were impeded and, in some instances halted, by the severe cold wave which swept the country last week. Plant shutdowns were numerous in Pennsylvania, Ohio, West Virginia, Indiana and Kentucky where the shortage of gas was most acute and where the snowfall checked the movement of raw materials and finished goods. Nearly 50,000 workers were forced into idleness during most of the period.

Effects of the storm on the steel industry were especially serious in the Pittsburgh district. While steel ingot production held up relatively well since producers provide most of their own fuel supplies, heat-treating and annealing operations were curtailed by lack of gas at many plants. The American Steel & Wire Co.'s plant at Donora, Pa., was closed and finishing operations at Carnegie-Illinois Steel Corp.'s Vandergrift and Johnstown mills were curtailed. Allegheny Ludlum Steel Corp. closed its West Leechburg plant and reduced sharply its operations at its Brackenridge plant. A check of steel fabricating plants in the Pittsburgh district showed operations ranging from around 50 to nearly 100 per cent, the latter in only a few instances.

In the Cleveland district, operations of the American Steel & Wire Co. were reduced about 50 per cent while those of other steel producers were less seriously affected, principally in pickling and annealing departments.

While production of ingots continued high, any interruption to the flow of finished steel has almost an immediate effect on the metalworking industries since their inventories generally are low and current consumption high.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Feb. 8	Change	Same Week 1946	Same Week 1945
Pittsburgh	94.5	— 6	1.5	80.5
Chicago	91	+ 1	5	99.5
Eastern Pa.	89	+ 1	6	87
Youngstown	89	+ 1	0	83
Wheeling	89	None	56	88
Cleveland	96.5	+ 1.5	0	86.5
Buffalo	90.5	None	0	72
Birmingham	99	None	0	95
New England	88	+ 4	10	92
Cincinnati	91	None	44	92
St. Louis	62.5	+ 0.5	19	75
Detroit	84	— 8	32	87
Estimated national rate	92	— 0.5	5.5	89.5

Based on weekly steelmaking capacity of 1,762,381 net tons for 1946; 1,831,636 tons for 1945; 1,791,287 tons for 1944.

Schedule of freight car production, for instance, calls for about 2 million tons to be shipped at a rate of 165,000 to 175,000 tons a month, beginning in April. This would permit construction of 7000 cars monthly.

Some of the larger steel producers are now opening books for second quarter and, while the situation varies with different interests and also with respect to products, it appears allotments will average slightly better than in the current quarter.

Shape producers are accepting specifications from the general trade for next quarter. In no case does it appear, however, that a buyer will receive as much as he would like to get. Fabricators estimate they will have to continue to operate on a somewhat limited scale—because of a shortage of plates, if not because of a shortage of shapes. Meanwhile most fabricating shops are booked up six to eight months ahead on the basis of what they can reasonably count on in the way of steel supply.

Steel producers are pressing production to the utmost but shortages of scrap are becoming increasingly serious. As a matter of fact, bidding for scrap is extremely spirited at some points and high prices are being bid on material from remote points.

Steel ingot production rate eased one-half point last week from the postwar high to 92 per cent of rated capacity. Operations dropped 6 points in Pittsburgh to 94.5 per cent, due chiefly to the three-day "wildcat" strike at Jones & Laughlin Steel Corp.'s Aliquippa Works, and 8 points in Detroit to 84 per cent, due to shutdowns for accumulated repairs. Increases were posted of 4 points to 88 per cent in New England, 1.5 points to 96.5 per cent in Cleveland, 1 point each to 91 per cent in Chicago, 89 per cent in Youngstown, and 89 per cent in eastern Pennsylvania, and 0.5 point to 62.5 per cent in St. Louis.

STEEL's composite market average for steelmaking scrap advanced further last week to $32.08 from $31.33 for the preceding period. Other averages were unchanged at $69.36 for finished steel, $52.10 for semifinished steel, and $29.56 for steelmaking pig iron.

COMPOSITE MARKET AVERAGES

	Feb. 8	Feb. 1	Jan. 25	One Month Ago Jan., 1947	Three Months Ago Nov., 1946	One Year Ago Feb., 1946	Five Year Ago Feb., 1942
Finished Steel	$69.36	$69.36	$69.36	$69.11	$64.45	$60.91	$56.73
Semifinished Steel	52.10	52.10	52.10	49.20	40.60	39.20	36.00
Steelmaking Pig Iron	29.56	29.56	29.56	29.56	27.50	24.75	23.00
Steelmaking Scrap	32.08	31.33	31.17	31.17	22.22	19.17	19.17

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished material (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Material

	Feb. 8, 1947	Jan., 1947	Nov., 1946	Feb., 1946
Steel bars, Pittsburgh	2.60c	2.60c	2.50c	2.375c
Steel bars, Philadelphia	2.98	2.98	2.86	2.695
Steel bars, Chicago	2.60	2.60	2.50	2.375
Shapes, Pittsburgh	2.50	2.462	2.35	2.225
Shapes, Philadelphia	2.64	2.602	2.48	2.340
Shapes, Chicago	2.50	2.462	2.35	2.225
Plates, Pittsburgh	2.65	2.612	2.50	2.375
Plates, Philadelphia	2.85	2.777	2.558	2.425
Plates, Chicago	2.65	2.612	2.50	2.375
Sheets, hot-rolled, Pittsburgh	2.50	2.50	2.425	2.3125
Sheets, cold-rolled, Pittsburgh	3.20	3.20	3.275	3.1625
Sheets, No. 10 galv., Pittsburgh	3.55	3.55	†4.05	†3.875
Sheets, hot-rolled, Gary	2.50	2.50	†2.425	†2.3125
Sheets, cold-rolled, Gary	3.20	3.20	3.275	3.165
Sheets, No. 10 galv., Gary	3.55	3.55	†4.05	†3.875
Hot-rolled strip, Pittsburgh	2.50	2.50	2.35	2.225
Cold-rolled strip, Pittsburgh	3.20	3.20	3.05	2.925
Bright basic, bess, wire, Pittsburgh	3.425	3.420	3.05	2.90
Wire nails, Pittsburgh	4.125	4.062	3.75	3.075
Tin plate, per base box, Pittsburgh	$5.75	$5.75	*$5.25	*$5.125

* Nominal. † Base changed in December to 10 gage.

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$58.00	$52.25	$38.00	$37.00
Slabs, Pittsburgh, Chicago	51.00	48.00	39.00	37.50
Rerolling billets, Pittsburgh	51.00	48.00	39.00	37.50
Wire rods ¼ to $\frac{9}{32}$-inch, Pitts.	2.675c	2.675c	†2.30c	2.225c

† Base changed in December from 24 gage to 10 gage.

Pig Iron

	Feb. 8, 1947	Jan., 1947	Nov., 1946	Feb., 1946
Bessemer, del. Pittsburgh	$31.83	$31.815	$29.77	$26.94
Basic, Valley	30.00	30.00	28.00	25.25
Basic, eastern del. Philadelphia	32.01	31.99	29.93	27.09
No. 2 fdry., del. Pgh. N. & S. sides	31.33	31.315	29.27	28.44
No. 2 fdry., del. Philadelphia	32.51	32.49	30.43	27.59
No. 2 foundry, Chicago	30.50	30.50	28.50	25.75
Southern No. 2, Birmingham	26.88	26.88	24.88	22.13
Southern No. 2, del. Cincinnati	31.75	31.75	28.94	26.05
Malleable, Valley	30.50	30.50	28.50	25.75
Malleable, Chicago	30.50	30.50	28.50	25.75
Charcoal, low phos., fob Lyles, Tenn.	37.50	37.50	33.00	33.00
Gray forge, del. McKees Rocks, Pa.	30.66	30.65	28.61	25.80
Ferromanganese, fob cars, Pittsburgh	140.00	140.00	140.00	140.00

Scrap

Heavy melting steel, No. 1, Pittsburgh	$32.50	$32.50	$23.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	33.75	31.00	21.90	18.75
Heavy melting steel, Chicago	30.00	30.00	21.75	18.75
Rails for rolling, Chicago	38.50	35.688	24.25	22.25
No. 1 cast, Chicago	42.50	41.25	29.00	20.00

Coke

Connellsville, furnace ovens	$8.875	$8.812	$8.75	$7.50
Connellsville, foundry ovens	9.875	9.812	9.50	8.25
Chicago, by-product fdry., del.	16.10	15.912	15.10	13.75

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Delivered prices do not include the 3 per cent federal tax on freight.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, price negotiated, fob mill. Copperweld Steel Co., electric furnace melted carbon ingots, $55-$60, Warren, O. Forging quality, $40, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, Coatesville, uncrop, $52.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $42; Portsmouth Steel Corp., $55-$60, Portsmouth, O. Detroit, del., $45.36; eastern Mich., $46.48.

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $50; Detroit, del., $53.36; eastern Mich., $54.48.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $61; del. Detroit $64.36; eastern Mich., $65.48.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $50; Portsmouth Steel Corp., $66 Portsmouth, O.

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb 2.35c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, ¼ to $\frac{9}{32}$-in., inclusive, $2.55-$2.80 per 100 lb. Galveston base, $2.65. Worcester, add $0.10. San Francisco (base, del.), $3.27.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham base, 20 tons one size, 2.60c; Detroit, del., 2.75c; eastern Mich., 2.80c; New York, del., 3.01c; Phila., del., 2.98c. San Francisco (base, del.), 3.33c; Los Angeles (base, del.), 3.325c.

Rail Steel Bars: Price, 2.60c-2.95c, same basing points as merchant carbon bars, except base is 10 tons.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 3.05c; Detroit, del., 3.20c; eastern Mich., 3.25c. (Texas Steel Co. uses Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.20c; Detroit, 3.35c; Toledo, 3.40c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 3.80c; Detroit, del., 3.95c; eastern Mich., 4.00c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.45c; Detroit, del., 2.60c; eastern Mich. and Toledo, 2.65c; San Francisco (base, del.), 3.03c; Los Angeles (base, del.), 3.025c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base, 2.60c-2.95c; Detroit, del., 2.75c; eastern Mich. and Toledo, del., 2.80c.

Iron Bars: Single refined, Pitts., 6.15c; double refined, 7.00c; Pittsburgh, staybolt, 7.85c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 2.50c; Detroit, del., 2.65c; eastern Mich., del., 2.70c; Philadelphia, del., 2.70c; New York, del., 2.79c. (Andrews Steel Co., quotes on Middletown, O., base for shipment to Detroit area; Alan Wood Steel Co., Conshohocken, Pa., quotes 3.10c, Sparrows Point Md., base; Granite City Steel Co., 2.875c, fob Granite City, Ill., 2.775c, fob Gary or Birmingham.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.20c; Granite City, base, 3.30c; Detroit, del., 3.35c; eastern Mich., del., 3.40c; New York, del., 3.61c; Philadelphia, del., 3.58c.

Galvanized Sheets, No. 10: Pittsburgh, Chicago, Gary, Birmingham, Youngstown, Sparrows Point, Middletown, base 3.55c; New York, del., 3.84c; Philadelphia, del., 3.75c.

Corrugated Galvanized Sheets, No. 10: Pittsburgh, Chicago, Gary, Birmingham, base, 3.55c.

Culvert Sheets, No. 16, not corrugated, copper alloy: Pittsburgh, Chicago, Gary, Birmingham, 4.15c; Granite City, 4.25c; copper iron 4.50c; pure iron, 4.50c.

Aluminized Sheets, No. 20 hot-dipped, coils or cut to lengths: Pittsburgh, 9.00c.

Long Ternes, No. 10: Pittsburgh, Chicago, Gary, base, 3.55c.

Enameling Sheets, No. 12: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 3.55c; Granite City, base, 3.65c; Detroit, del., 3.70c; eastern Mich., 3.75c.

Electrical Sheets, No. 24: Field: 4.20c, Pittsburgh, Chicago, Gary; 4.30c, Kokomo, Ind. Armature: 4.50c, Pittsburgh, Chicago, Gary; 4.60c, Granite City, Ill.; Kokomo. Electric: 5.00c, Pittsburgh, Chicago, Gary; 5.10c, Granite City, Kokomo. Motor: 5.75c, Pittsburgh, Chicago, Gary; 5.85c, Granite City. Dynamo: 6.45c, Pittsburgh; 6.55c, Granite City. Transformer 72, 6.95c; 65, 7.65c; 58, 8.35c; 52, 9.15c, Pittsburgh.

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 2.50c; Detroit, del., 2.65c; eastern Mich., del., 2.70c. (Superior Steel Corp., 3.30c, Pittsburgh).

Cold-Rolled Strip, 0.25 carbon and less: Pittsburgh, Cleveland, Youngstown, 3.20c; Chicago, base, 3.30c; Detroit, del., 3.35c; eastern Mich., 3.40c; Wooster, base, 3.40c. (Superior Steel Corp., 4.70c, Pittsburgh.)

Cold-Finished Spring Steel, 0.26-0.40 carbon: Pittsburgh, Cleveland, base, 3.20c; add 0.20c for Worcester.

Tin, Terne, Plate

Tin Plate: Pittsburgh, Chicago, Gary, Warren, O., 100-lb base box, $5.75; Granite City, Birmingham, Sparrows Point, $5.85.

Electrolytic Tin Plate: Pittsburgh, Gary, Warren, O., 100-lb base box 0.25 lb tin, $4.85; 0.50 lb tin, $5.05; 0.75 lb tin, $5.25; Granite City, Birmingham, Sparrows Point, $4.95, $5.15, $5.35, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, Warren, O., base 29-gage and lighter, 3.60c; Granite City, Birmingham, Sparrows Point, 3.70c.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, 100-base box, $4.90; Granite City, Birmingham, Sparrows Point, $5.00.

Roofing Ternes: Pittsburgh base per package 112 sheets: 20 x 28 in., coating I. C. 8-lb $13.50; 15-lb $15.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, 2.65c; Coatesville, Claymont, Geneva, Utah, 2.80c; New York, del. 2.94c; Phila., del., 2.85c; St. Louis, del., 2.74c; Boston, del., 2.86c. (Central Iron & Steel Co., Harrisburg, Pa., 3.40c, basing points; Alan Wood Steel Co., Conshohocken, Pa., 2.80c, Coatesville and Claymont equivalent.)

Floor Plates: Pittsburgh, Chicago, 3.90c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, 3.787c; Coatesville, 4.15c.

Clad Steel Plates: Coatesville, 10% cladding: nickel clad, 21.50c; inconel-clad, 30.00c; monel-clad, 29.00c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.50c; Geneva, Utah, 2.65c; New York, del., 2.70c; Phila., del., 2.64c.

(Phoenix Iron Co., Phoenixville, Pa., nominally, 3.05c, Bethlehem, Pa., equivalent.)

Steel Piling: Pittsburgh, Chicago, Buffalo, $3 per 100 lb.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham per 100 pounds).

Wire to Manufacturers in carloads

Bright, basic or bessemer	*$3.30-$3.55
Spring (except Birmingham)	**$4.25

Wire Products to Trade

Nails and Staples

Standard and cement-coated	†$3.75-$4.50
Galvanized	‡$3.75-$4.50

Wire, Merchant Quality

Annealed (6 to 8 base)	§$3.95
Galvanized (6 to 8 base)	§$4.40

(Fob Pittsburgh, Chicago, Birmingham, per base column)

Woven fence, 15 gage and heavier	††84
Barbed wire, 80-rod spool	††94
Barbless wire, twisted	94
Fence posts	††82
Bale ties, single loop	††86

* Add $0.10 for Worcester, $0.05 for Duluth. San Francisco (base, del.), $4.31 for bright basic only.

** Add $0.10 for Worcester, $0.25 for Duluth and Trenton, N. J. San Francisco (base, del.), $5.63 for MB spring wire; $5.28, black premier.

† Add $0.30 Worcester; $0.10 Cleveland. San Francisco (base del.), $4.83.

‡ San Francisco (base del.), $4.85.

§ Add $0.10 for Worcester. San Francisco (base, del.), $4.96 for annealed; $5.41 galvanized.

†† San Francisco (base, del.) woven fence, 107; barbed wire, 114; bale ties, 110; Duluth, fence posts, 84.

Rails, Supplies

Rails: Standard, over 60-lb. fob mill, $2.50 per 100 lb. Light rails (billet), Pittsburgh, Birmingham, $2.85 per 100 lb; light rails (rail steel), $2.95, Williamsport, Pa.
Relaying, 35 lb and over, fob railroad and basing point, $43-$46 per net ton.

Supplies: Track bolts, 6.50c; heat treated, 6.75c. Tie plates, $2.80 per 100 lb, fob mill. Splice bars, $3 per 100 lb. Standard spikes, 3.65c-4.50c; screw spikes, 5.30c-6.40c.

Tubular Goods

Standard Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh on all types; Lorain on steel butt weld, and seamless; Gary, Ind., 2 points less on steel lap weld and 1 point less on steel butt weld on sizes produced in that district.

Butt Weld

	Steel			Iron	
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	48	23	¼	— 2	+20
¼ & ⅜	51	30½	⅜	—11½	+10
½	55½	41	1-1¼	—17	+ 2
¾	58½	45	1½	—22½	— 1½
1-3	60½	47½	2	—23	— 2

Lap Weld

	Steel			Iron	
In.	Blk.	Gal.	In.	Blk.	Gal.
2	53	39½	1¼	— 1	+20
2½-3	56	42½	1½	— 7	+13
3½-6	58	44½	2	—14½	+ 5½
*8	58	42½	2½-3½	—17	+ 1½
*10	57½	42	4	—21	— 4
*12	56½	41	4½-8	—19	— 2½
			9-12	—10	+ 7

* Not T. & C.

Seamless

	Steel				
In.	Blk.	Gal.	In.	Blk.	Gal.
2	52	38½	*8	57	42
2½-3	55	41½	*10	56½	42
3½-6	57	43½	*12	55½	41

* Not T. & C.

Line Pipe: Base price in carlots to consumers about $200 a net ton. Base discounts Pittsburgh and Lorain, O.

In.	Seamless	In.	Butt Weld
2	51	⅛	47
2½ & 3	54	¼ & ⅜	50
3½ to 8	56	½	54½
10	55½	¾	57½
12	54½	1 to 3	59½

Boiler Tubes: Net base prices per 100 feet, fob Pittsburgh, in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D.		—Seamless—		—Elec. Weld—	
Sizes	B.W.G.	Hot Rolled	Cold Drawn	Hot Rolled	Cold Drawn
1"	13	....	$10.89	$10.62	$10.62
1¼"	13	....	12.90	10.59	12.58
1½"	13	$12.00	14.26	11.70	13.90
1¾"	13	13.65	16.23	13.31	15.82
2"	13	15.29	18.17	15.00	17.95
2¼"	13	17.05	20.26	16.71	20.00
2¼"	12	18.78	22.31	18.38	22.00
2½"	12	20.57	24.43	20.11	24.07
2¾"	12	21.80	25.89	21.27	25.46
3"	12	22.87	27.18	22.26	26.68
3¼"	11	26.88	31.94	26.15	31.33
3½"	11	28.86	34.30	28.06	33.64
4"	10	35.82	42.55	34.78	41.68
4½"	9	47.48	56.42	....	....
5"	9	54.96	65.30	....	....
6"	7	84.38	100.25	....	....

Pipe, Cast Iron: Class B, 6-in. and over $65 per net ton, Birmingham; $70, Burlington, N. J.; $75.56, del., Chicago; 4-in. pipe, $5 higher, Class A pipe, $3 a ton over class B.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago; add 15c per cwt, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step and plow bolts.

Carriage and Machine

½-in. and smaller; up to 6 in. in length	55 off
⅝ and ⅝, up to 6 in. in length	52 off
¾ x 6 in.	49 off
⅞ and 1 in. x 6 in. length	51 off
1⅛ in. and larger in all lengths and ⅛ in. and larger in lengths over 6 in.	48 off
½ in. and smaller, longer than 6 in.	45 off
Tire bolts	38½ off
Step bolts	46 off
Plow bolts	57 off

Stove Bolts

In packages, nuts separate, 60-10 off; bulk 74 off on 15,000 of 3-in. and shorter, or 5000 over 3-in., nuts separate.

Nuts

	A.S. Light	A. S. Reg. and Heavy
Semifinished hexagon		
⅞-in. and smaller	51 off	....
½-in. and smaller	....	48 off
½-in.-1-in	48 off	....
⅝-in.-1-in.	....	47 off
1⅛-in.-1½-in.	46 off	45 off
1⅝-in. and larger	....	44 off

Additional discount of 15 for full containers.

Hexagon Cap Screws

Upset 1-in., smaller (10-20 bright)	56 off
Upset (10-35 heat treated)	
⅝ x 6	51 off
¾, ⅞ & 1 x 6	47 off

Square Head Set Screws

Upset 1-in. and smaller	61 off
Headless, ¼-in. and larger	46 off
No. 10 and smaller	56 off

Rivets

Fob Pittsburgh, Cleveland, Chicago Birmingham, Lebanon, Pa.

Structural	5.25c
⅞-inch and under	55-5 off

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl | $1.50-$2.00 off

Tool Steels

Tool Steel: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 15.15c; extra carbon 19.48c; special carbon 23.80c; oil-hardening 25.97c; high carbon-chromium 46.53c.

W	Cr	V	Mo	Base, per lb
18.00	4	1	..	72.49c
1.5	4	1	8.5	58.43c
..	4	2	3	58.43c
6.40	4.15	1.90	5	62.22c
5.50	4.50	4	4.50	75.74c

Stainless Steels

Base, Cents per lb

Grade	Bars, Drawn Wire, Structurals	Plates	Sheets	Hot Rolled Strip	Cold Rolled Strip
	CHROMIUM NICKEL STEELS				
301	26.00c	29.50c	37.00c	22.00c	28.00c
302	26.00	29.50	37.00	23.50	30.50
303	28.50	31.50	39.00	29.50	36.00
304	27.50	31.50	39.00	25.50	32.50
308	31.50	37.00	44.50	31.00	38.00
309	39.00	43.50	51.00	40.50	51.00
310	53.50	56.50	57.50	53.00	61.00
316	43.50	48.00	52.00	43.50	52.00
321	31.50	37.00	44.50	32.00	41.50
347	36.00	41.50	49.00	36.00	45.50
431	21.00	24.00	31.50	19.00	24.50
440A	26.00	31.00	36.50	26.00	30.50
	STRAIGHT CHROMIUM STEEL				
403	23.50	27.00	32.00	23.00	29.50
410	20.50	23.50	29.00	18.50	24.00
416	21.00	24.00	29.50	20.00	25.50
420	26.00	31.00	36.50	26.00	33.50
430	21.00	24.00	31.50	19.00	24.50
430F	21.50	24.50	32.00	20.50	27.00
442	24.50	28.00	35.50	26.00	35.00
443	24.50	28.00	35.50	26.00	35.00
446	30.00	33.00	39.50	38.00	56.50
*501	9.00	13.00	17.50	13.00	18.50
*502	10.00	14.50	18.50	14.50	19.50
	†STAINLESS CLAD STEEL (20%)				
304	....	24.00	22.00	....	....
410	....	22.00	20.00	....	....
430	....	22.50	20.50	....	....
446	....	29.00	27.00	....	....

* Low chromium. † Fob Pittsburgh and Washington, Pa.; plate prices include annealing and pickling.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*$8.75-$9.00
Connellsville, foundry	9.75-10.00
New River, foundry	11.75
Wise county, foundry	9.00-9.50
Wise county, furnace	8.50-9.00

* Operators of hand-drawn ovens using trucked coal, $9.35-$9.60.

Coke By-Products

Spot, gal, freight allowed east of Omaha

Pure and 90% benzol	17.00c
Toluol, two degrees	22.00c
Industrial xylol	22.00c
Solvent naphtha	26.00c
Per pound fob works	
Phenol (car lots, returnable drums)	11.25c
Do., less than carlots	12.00c
Do., tank cars	10.25c
Eastern plants, per pound	
Naphthalene flakes, balls, bbl, to jobbers, "household use"	9.50c
Per ton, bulk, fob plants	
Sulphate of ammonia	$30.00

PIG IRON

Prices per gross ton. Minimum delivered prices do not include 3 per cent federal tax.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$31.50	$31.00	$32.50	$32.00
Newark, N. J., del.	33.34	32.84	34.34	35.54
Brooklyn, N. Y., del.	34.50	....	....	35.00
Birdsboro, Pa., base	34.50	34.00	35.50	35.00
Birmingham, base	26.88	25.50	31.50	....
Baltimore, del.	33.28	....	....	....
Boston, del.	*31.62	....	....	....
Chicago, del.	31.12	....	....	....
Cincinnati, del.	31.75	30.37	....	....
Newark, N. J., del.	32.96	....	....	....
Philadelphia, del.	32.13	31.63	....	....
St. Louis, del.	30.87	31.79	....	....
Buffalo, base	30.50	30.00	31.50	31.00
Boston, del.	36.98	36.48	37.98	37.48
Rochester, del.	32.34	31.84	33.34	32.84
Syracuse, del.	33.00	32.50	34.00	33.50
Chicago, base	30.50	30.00	31.00	30.50
Milwaukee, del.	31.82	31.32	32.32	31.82
Muskegon, Mich., del.	34.33	....	....	34.33
Cleveland, fob furnace	30.50	30.00	31.00	30.50
Akron, Canton, del.	32.17	31.67	32.67	32.17
Detroit, base	30.50	30.00	31.00	30.50
Saginaw, Mich., del.	33.67	33.17	34.17	33.67
Duluth, base	31.00	30.50	31.50	31.00
Erie, Pa., base	30.50	30.00	31.50	31.00
Everett, Mass., base	29.50	29.00	30.50	30.00
Boston, del.	30.00	29.50	31.00	30.50
Granite City, Ill., base	30.50	30.00	31.00	30.50
St. Louis, del.	31.25	30.75	....	31.25
Neville Island, Pa., base	30.50	30.00	31.00	30.50
†Pittsburgh, del., N.&S. sides	31.33	30.83	31.83	31.33
Provo, Utah, base	30.50	30.00	....	....
Sharpsville, Pa., base	30.50	30.00	31.00	30.50
Steelton, Pa., base	31.50	31.00	32.50	32.00
Swedeland, Pa., base	31.50	31.00	32.50	32.00
Philadelphia, del.	32.51	32.01	....	33.01
Toledo, O., base	30.50	30.00	34.50	34.00
Cincinnati, del.	34.00	33.50	....	....
Youngstown, O., base	30.50	30.00	31.00	30.50
Mansfield, O., del.	33.48	32.98	33.98	33.48

* Plus Jan. 1 freight rate increase.

† To Neville Island base add: 66c for McKees Rocks, Pa.; $1.01 Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; $1.33, Ookmont, Verona; $1.49 Brackenridge.

Exceptions to above prices: Kaiser-Frazer Parts Corp., Struthers, O., charges 50 cents a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable pig iron.

High Silicon Silvery

6.00-6.50 per cent (base) $38.00
6.51-7.00 .. $39.00 | 9.01- 9.50 .. 44.00
7.01-7.50 .. 40.00 | 9.51-10.00 .. 45.00
7.51-8.00 .. 41.00 | 10.01-10.50 .. 46.00
8.01-8.50 .. 42.00 | 10.51-11.00 .. 47.00
8.51-9.00 .. 43.00 | 11.01-11.50 .. 48.00

Fob Jackson, O., per gross ton, Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Electric Furnace Ferrosilicon: Si 14.01-14.50%, $52.75, Jackson, O.; $56 Keokuk, Iowa; $54, Buffalo and Niagara Falls, N. Y. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.045% max. phos.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn.... $37.50 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $30.00

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., $36, base; Birdsboro, Pa., $39, base; Philadelphia, $38.16, del. Intermediate phosphorus, Central furnace, Cleveland, $33.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge not to exceed 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge not to exceed 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Refractories

Per 1000, fob shipping point
Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky. $81.00

High Heat Duty

Pa., Ill., Md., Mo., Ky. 65.00
Ala., Ga. 65.00
N. J. 70.00

Intermediate Heat Duty

Ohio 57.00
Pa., Ill., Md., Mo., Ky. 59.00
Ala., Ga. 51.00
N. J. 62.00

Low Heat Duty

Pa., Md., Ohio..... 51.00

Malleable Bung Brick

All bases 75.00

Ladle Brick

(Pa., O., W. Va., Mo.)
Dry Press 42.00
Wire Cut 40.00

Silica Brick

Pennsylvania 65.00
Joliet, E. Chicago..... 74.00
Birmingham, Ala. 65.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.
Bulk 22.00
Bags 26.00

Basic Brick

Net ton, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick 54.00
Chem. bonded chrome..... 54.00
Magnesite brick 76.00
Chem. bonded magnesite..... 65.00

ORES

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer $5.95
Old range nonbessemer..... 5.80
Mesabi bessemer 5.70
Mesabi nonbessemer 5.55
High phosphorus 5.55

Eastern Local Ore

Cents, units, del. E. Pa.
Foundry and basic 56-63% contract 14.00

Foreign Ore

Cents per unit, cif Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mn.... Nom.
N. African low phos..... Nom.
Swedish basic, 60 to 68% 13.00
Spanish, No. African basic, 50 to 60%..... Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro..... 7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid $24.00

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash.
(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1 ..... $37.50
48% 3:1 ..... 39.00
48% no ratio..... 31.00

South African (Transvaal)

44% no ratio .....$27-$27.50
45% no ratio..... 28.00
48% no ratio..... 30.00
50% no ratio..... 31.00

Brazilian—nominal

44% 2.5:1 lump $33.65
48% 3:1 lump 43.50

Rhodesian

45% no ratio..... $27-$27.50
48% no ratio..... 30.00
48% 3:1 lump..... 39.00

Domestic (seller's nearest rail)
48% 3:1 ..... $39.00

Manganese Ore

Sales prices of Office of Metals Reserve, cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91c; prices include duty on imported ore and are subject to established premiums, penalties and other provisions. Price at basing points which are also points of discharge of imported manganese ore is fob cars, shipside, at dock most favorable to the buyer. Outside shipments direct to consumers at 15c per unit less than Metals Reserve prices.

Molybdenum

Sulphide conc., lb., Mo. cont., mines $0.75

Fluorspar

Metallurgical grade, fob shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $33; 65% to 70%, $32; 60% to 65%, $31; less than 60%, $30.

HIGH-STRENGTH—LOW-ALLOY STEELS

Prices in dollars per 100 pounds.

	Pittsburgh	Chicago	Gary	Youngstown	Sparrows Point	Buffalo	Bethlehem	Canton	Massillon
Sheets, Hot-Rolled	3.75-3.85	3.75-3.85	3.75-3.85	3.85	3.85	3.75-3.85	...	...	...
Cold-Rolled	4.55-4.75	4.55-4.75	4.55-4.75	4.75	...	4.55-4.75	...	...	...
Galvanized	5.40	.....	.....	...	...	.....	...	...	...
Strip, Hot-Rolled	3.75-3.85	3.75-3.85	3.75-3.85	3.85	...	.....	...	...	...
Cold-Rolled	4.55	4.65	4.65	4.65	...	.....	...	...	...
Shapes, Structural	3.85	3.85	.....	3.85	...	.....	3.85	...	...
Plates	4.10	4.10	4.10	...	4.10	.....	...	...	...
Bars and Bar Shapes	4.00	4.00	4.00	4.00	...	4.00	4.00	4.00	4.00

Note: Lower level of quoted ranges represent prices for NAX, produced by Great Lakes Steel Corp., Detroit.

WAREHOUSE STEEL PRICES

Base prices, cents per pound, for delivery within switching limits, subject to extras

	SHEETS					STRIP		BARS				PLATES	
	H-R 10G	C-R 10G	C-R 17G	Gal. *10G	Gal. *24G	†H-R	C-R	H-R	C-F	H-R Alloy (‡4140)	Structural Shapes	Carbon ¼"-¾"	Floor ⅝" & Thicker
Boston (city)	4.50	....	5.22[4]	6.80[4]	6.80[4]	4.65	6.36	4.62	5.47	7.12	4.47	4.80	6.42
Norfolk, Va.	4.35	....	....	....	....	....	....	4.75	5.50	....	4.50	4.50	6.25
††New York (city)	4.42	....	5.27[5]	5.47[5]	....	4.62	....	4.62	5.42	8.42[13]	4.37	4.64	6.35
New York (country)	4.32	....	5.17[5]	5.37[5]	....	4.52	....	4.52	....	....	4.27	4.54	6.25
Baltimore (city)	4.09	....	5.65[3]	....	6.39[4]	4.40	....	4.45	5.35	....	4.34	4.39	5.90
Baltimore (country)	3.59	....	5.55[3]	....	....	....	....	....	4.85	....	4.24	4.29	5.80
Washington, (city)	4.35	....	....	....	....	4.65	....	4.70	5.60[11]	....	4.60	4.65	6.60
Buffalo (city)	4.00	....	4.70[6]	4.35[6]	....	4.30	4.95	4.05	4.95	....	4.05	4.60	5.90
Buffalo (country)	3.90	....	4.60[6]	4.95[4]	....	3.90	4.60	3.95	4.85	6.60	3.95	4.20	5.45
Philadelphia (city)	4.24	5.73	5.33[9]	5.29[5]	6.54[5]	4.43	5.28	4.48	5.38	6.87	4.22	4.40	5.93
Philadelphia (country)	4.14	5.63	5.23[9]	5.19[5]	6.44[5]	4.33	5.18	4.38	....	6.60	4.12	4.30	5.83
Pittsburgh (city)	4.00	5.15	4.70[5]	5.05	6.30[5]	4.00	4.95	4.05	4.95	6.60	4.05	4.30	5.55
Pittsburgh (country)	3.90	5.05	4.60[5]	4.95	6.20[5]	3.90	4.85	3.95	4.85	6.60	3.95	4.20	5.45
Cleveland (city)	4.00	5.15	4.70[5]	5.238[5]	6.488[5]	4.188	....	4.05	4.95	6.858	4.311	4.30	5.811
Cleveland (country)	3.90	5.05	4.60[5]	....	....	....	....	3.95	4.85	....	....	4.20	....
Cincinnati	4.116	5.266[5]	....	5.166[5]	....	4.394	....	4.403	5.303	....	4.444	4.653	5.944
Chicago (city)	4.00	5.15[5]	4.70[5]	5.05[5]	6.30[5]	4.00	....	4.05	4.95	6.60	4.05	4.30	5.70
Chicago (country)	3.90	5.05[5]	4.60[5]	4.95[5]	6.20[5]	3.90	....	3.95	4.85	6.60	3.95	4.20	5.60
Milwaukee	5.99	7.14[5]	6.69[5]	7.04[5]	8.29[5]	5.99	....	6.04	6.94	8.59	6.04	6.29	7.69
Indianapolis	4.04	....	4.84[5]	5.29	6.54	4.24	....	4.36††	5.26	....	4.36	4.61	6.01
St. Paul	4.384[1]	5.534[5]	5.084[5]	5.434[5]	6.684[5]	4.404[13]	....	4.434[13]	5.726[11]	7.084[13]	4.434[13]	4.684[13]	6.084[13]
St. Louis	4.199	....	4.899[5]	....	6.674[5]	4.199	....	4.249	5.324[15]	7.074	3.999	3.999	5.999
New Orleans	4.46**	....	5.77[5]	....	....	4.83[20]	....	4.78**	6.14[11]	....	4.68**	4.83[20]	6.94[20]
Houston, Tex.	4.50[1]	....	....	....	6.00[12]	....	....	4.75[1]	....	....	....	....	....
Oklahoma, Nebr.	4.868	6.118[5]	....	5.918[5]	7.168[5]	4.862	....	4.918	5.818[11]	....	4.918	5.168	6.568
Omaha, Nebr.	4.868	6.118[5]	....	5.918[5]	7.168[5]	4.862	....	4.918	5.818[11]	....	4.918	5.168	6.568
San Francisco	4.90	....	6.30[5]	....	7.35[5]	5.20[14]	8.35[15]	4.75[14]	***	9.35[16]	4.90[14]	5.00[14]	6.80[14]
Tacoma, Wash.	...	...	...	7.30[5]	...	5.20[17]	....	4.90[17]	6.75[19]	8.95[19]	4.95[17]	5.25[17]	7.25[17]
Seattle	...	...	...	7.30[5]	...	5.20[17]	....	4.90[17]	6.75[19]	8.95[19]	4.95[17]	5.25[17]	7.25[17]

Base Quantities: 400 to 1999 pounds except as noted: Cold-rolled strip, 2000 to 39,999 pounds; cold finished bars, 1000 pounds and over; [1]—any quantity; [2]—300 to 1999 pounds; [3]—150 to 2249 pounds; [4]—three to 24 bundles; [5]—450 to 1499 pounds; [6]—one bundle to 1499 pounds; [7]—one to nine bundles; [8]—400 to 1499 pounds; [9]—1000 to 1999 pounds; [10]—450 to 39,999 pounds; [11]—1000 to 39,999 pounds; [12]—1000 pounds and over; [13]—400 to14,999 pounds; [14]—400 to 39,999; [15]—2000 lb and over; [16]—1000 to 49,999; [17]—300 to 9999 pounds; [18]—1500 to 1999 pounds; [19]—1500 to 39,999; [20]—400 to 3999 pounds.

* Includes gage and coating extra; † does not include gage extras; ‡ basing point cities with quotations representing mill prices plus warehouse spread; §as rolled, except New York, Jersey City, Indianapolis and San Francisco where price represents annealed basis; **add 0.46 for sizes not rolled in Birmingham; ††same prices quoted for Jersey City, N. J.; ‡‡add 15c for 100 lb for slow moving items; §§18 gage and heavier; ***rounds under ⅜ in. 7.00c, ⅜ in. and over 6.50c, squares, hexagons and flats 6 in. and narrower 7.50c, flats over 6 in. 8.25c.

Open Market Prices of Le ading Ferroalloy Products

Spiegeleisen: 19-21% carlot per gross ton, Palmerton, Pa., $40; Pittsburgh, $40.50; Chicago, $40.60.

Ferromanganese, standard: 78-82% c.l. gross ton, duty paid, $135 fob cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Co. is producer); $140 fob cars, Pittsburgh, including 50c switching charge, (where Carnegie - Illinois Steel Corp. is producer); add $8 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese, low carbon: Eastern zone: Special, 21c; regular, 20.50c; medium, 14.50c; central zone: special, 21.30c; regular, 20.80c; medium, 14.80c; western zone: Special, 21.70c; regular, 21.20c; medium, 15.20c. Prices are per pound contained Mn, bulk carlot shipments, fob shipping point, freight allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

Ferromanganese Briquets: (Weight approx. 3 lb and containing exactly 2 lb Mn) Prices per lb of briquets: Contract, carlots, bulk 6.40c, packed 6.90c, tons 7.30c, less 7.70c, eastern, freight allowed; 6.65c, 7.15c, 7.90c and 8.30c, central; 7.20c, 7.70c, 9.80c and 10.20c, western; spot up 0.25c; notched up 0.25c.

Ferrotungsten: Spot, 10,000 lb or more, per lb contained W, $1.90; contract, $1.88; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb contained Ti; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5c per lb.

Ferrotitanium: 20-25%, 0.10 maximum C; per lb contained Ti; ton lots $1.35; less-ton lots $1.40 eastern. Spot up 5c per lb.

Ferrotitanium, High-Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C $142.50; 3-5% C $157.50.

Ferrovanadium: V 35-55%, contract basis, per lb contained V, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Ferromolybdenum: 55-75% per lb, contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 12.95c, ton lots 13.45c, smaller lots 13.95c; 80-90%, c.l. 11.35c, ton lots 11.90c, smaller lots 12.45c; 75%, c.l. 10.15c, ton lots 10.75c, smaller lots 11.35c; 50% c.l. 8.45c, ton lots 9.10c, smaller lots 9.75c. Deduct 1.0c for bulk carlots 75%, 80-90%, 90-95%. Prices are fob shipping point, freight allowed, per lb of contained Si. Spot prices 0.25c higher on 80-90%, 0.30c on 75%, 0.45c on 50%.

Ferroboron: (B 17.50% max. and C 1.50% max., Al 0.50% max. and C 0.50% max.) Prices per lb of alloy, contract, ton lots $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Ferrocolumbium: 50-60%, per lb contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.50; less ton lots $2.55. Spot up 10c.

Ferrochrome: Contract, lump, packed; **high carbon,** eastern zone, c.l. 16.20c, ton lots 16.80c; central zone, add 0.40c and 1.30c; western zone, add 0.55c and 2.10c. Deduct 0.60c for bulk carlots.

High carbon, high nitrogen, add 5c to all high carbon ferrochrome prices. Deduct 0.55c for bulk carlots. Spot prices up 0.25c.

Low carbon, eastern zone, bulk, c.l., max. 0.06% C 23c; 0.1% 22.50c, 0.15% 22c, 0.2% 21.50c, 0.5% 21c, 1% 20.50c, 2% 19.50c; add 1c for 2000 lb to c.l.; central zone, add 0.4c for bulk, c.l., and 0.65c for 2000 lb to c.l.; western zone, add 0.5c for bulk, c.l., and 1.85c for 2000 lb to c.l.; carload packed differential 0.45c. Prices are per pound of contained Cr, fob shipping points.

Low carbon, high nitrogen: Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%.

Ferrochrome, Special Foundry: (Cr 62-66%, C above 5-7%.) Contract, 2-inch x D, packed, eastern zone, freight allowed, c.l. 17.05c, ton lots 17.60c, less than ton 18.30c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, high carbon: (Cr 60-65%, Si, Mn and C 4-6% each.) Contract, lump, packed, eastern zone, freight allowed, c.l. 17.30c, ton lots 17.90c, less than ton 18.60c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Prices are per pound of contained chromium, spot prices 0.25c higher. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk 20.00c, packed 20.15c; ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained Cr; 20.40c, 20.50c, 20.95c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up 0.25c.

Ferrochrome Briquets: Containing exactly 2 lb Cr, packed eastern zone, c.l. 10.35c, ton lots 10.75c, less than ton 11.15c; central zone, add 0.25c for c.l. and 0.90c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.50c for bulk carlots. Prices per pound of briquets; spot prices 0.25c higher; notched, 0.25c higher.

Chromium Metal: 97% min. Cr, max. 0.50% C, eastern zone, per lb contained Cr bulk, c.l. 79.50c, 2000 lb to c.l. 80c; central 81c and 82.60c; western 82.25c and 84.75c, fob shipping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) Contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Calcium metal; cast: Contract, ton lot or more, $1.60; 100 to 1999 lb, $1.95; less than 100 lb, $3.15 per lb of metal, eastern zone; $1.615, $1.965 and $3.185, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up 0.25c.

Calcium - Silicon: (Ca 30-35%, Si

60-65% and Fe 3.00% max.), per lb of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up 0.25c.

Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l. 13.65c; 2000 lb to c.l., 15.05c; central zone, 14.25c and 17.30c; western; 14.85c and 19.05c; min. 96% Si and max. 2% Fe, eastern, bulk, c.l. 13.15c, 2000 lb to c.l. 14.65c; central, 13.85c and 16.90c; western, 14.45c and 18.65c, fob shipping point, freight allowed. Price per lb contained Si.

Silicomanganese, containing exactly 2 lb Mn and about ½ lb Si eastern zone, bulk, c.l. 6.15c, ton lots 7.05c; central zone, add 0.25c for c.l. and 0.60c for ton lots; western, add 0.80c for c.l. and 2.50c for ton lots. Notched, up 0.25c.

Ferrosilicon: Weighing about 5 lb and containing exactly 2 lb Si, packed, eastern zone, c.l. 4.20c, ton lots 4.60c, less than ton lots 5c; weighing about 2½ lb and containing 1 lb Si, packed, eastern zone, c.l. 4.35c, ton lots 4.75c, less 5.15c; notched 0.25c higher; central zone, add 0.25c for c.l. and 0.60c for smaller lots; western zone, add 0.45c for c.l. and 0.90c for smaller lots. Prices are fob shipping point, freight allowed; spot prices 0.25c higher. Deduct 0.50c for bulk carlots.

Manganese Metal: (Min. 96% Mn, max. 2% Fe), per lb of metal, eastern zone, bulk, c.l. 30c, 2000 lb to c.l., 32.00c; central 31.00c and 33.45c; western, 31.45c and 34.40c.

Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) Prices per lb of alloy. Contract, ton lots $1.89, less $2.01, eastern, freight allowed; $1.903 and $2.023, central; $1.935 and $2.055, western; spot up 5c.

Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance). Prices per lb of alloy, Contract, 5 tons or more $1.90, 1 ton to 8 tons $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Borosil: 3 to 4% B, 40 to 45% Si; $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: B 1.5-1.9%, ton lots, 45c per lb; less-ton lots, 50c per lb.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%) Prices per lb of alloy, contract, or spot carlots 35.00c, ton lots 37.00c, less 39.00c, eastern, freight allowed; 35.30c, 38.10c and 40.10c, central; 35.30c, 40.05c and 42.05c, western; spot up 0.25c.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) Prices per lb of alloy, contract, carlots 12.50c, ton lots 13.25c, less 14.00c, eastern zone, freight allowed; 12.80c, 14.35c and 15.10c, central; 12.80c, 16.30c and 17.05c, western; spot up 0.25c.

CMSZ Alloy 4: (Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75% and C 3.00-4.50%). Contract or spot, carlots, bulk 12.00c, packed 12.75c; ton lots 13.50c, less 14.25c, eastern zone, freight allowed; 12.30c, 13.05c, 14.60c, 15.35c, central; 12.30c, 13.05c, 16.65c, 17.30c, western.

CMSZ Alloy 5: (Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%) Prices per lb of alloy, contract or spot, carlots, bulk 11.75c, packed 12.50c, ton lots 13.25c, less 14.00c, eastern, freight allowed; 12.05c, 12.80c, 16.30c, 17.05c, western.

Zirconium Alloy: 12-15%, per lb of alloy, eastern, contract, carlots, bulk 4.85c, packed 5.30c, ton lots 5.65c, less 6.00c; spot up 0.25c.

Zirconium Alloy: Zr 35-40%, eastern, contract basis, carloads in bulk or package, per lb of alloy 14.50c, ton lots 15.75c, less 17.00c; spot up 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) Contract basis fob Niagara Falls, N. Y., lump per lb 6.25c; ton lots 6.75c; less 7.25c. Spot up ½c.

Simanal: (Approx. 20% each Si, Mn, Al) Packed, lump, carload 9c, ton lots 9.25c, less-ton lots 9.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Tungsten Metal Powder: Spot, not less than 97%, $2.50-$2.60; freight allowed as far west as St. Louis.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

Vanadium Pentoxide, technical grade: Fused, approx. 89-92% V_2O_5 and 5.84% NA_2O; or air dried, 83-85% V_2O_5 and 5.15% NA_2O, $1.10 per lb contained V_2O_5 fob plant freight allowed on quantities of 25 lb and over to St. Louis.

Nonferrous Metal Demand Continues Pressing

More copper may be imported to augment supplies . . . Zinc remains firm . . . Lead supply improving . . . Tin export permits refused

NEW YORK—As a general thing the nonferrous metal markets were quiet last week though demand continues in excess of supplies in most directions. Outstanding activity in the markets centered in copper scrap, especially on the part of custom smelters.

COPPER — Demand for copper was strong with tonnage moving at two prices, 20.50c Connecticut Valley on American Smelting & Refining Co. basis, and 19.50c Valley with other sellers. Fabricators, however, continued to price their products on the basis of the 19.50c price.

Over the recent past the wire and cable industry has been the most active buyer in the market.

Currently there is considerable discussion making the rounds for the necessity of importing large quantities of foreign copper when the Office of Metals Reserve supply ends around Mar. 31. Many consumers are reported ready to buy foreign metal, counting on repeal or suspension of the 4 cents import tax, or on benefitting from drawback provisions on exports of fabricated products. Moderate tonnages of bonded copper are reported as having been sold to domestic consumers.

SCRAP COPPER — Custom smelters have been actively buying scrap. Increase in price on No. 1 copper wire scrap to 18.75c appears to have brought out larger volume. A week ago there was a shortage of this material which was being diverted to other channels. To correct this situation a leading custom smelter raised its price 1 cent to 18.75c and at the same time increased its price for refined copper 1 cent to 20.50c. These moves appear to have stimulated the movement of scrap. At any rate the smelter which initiated the advance in a few days withdrew from the market after obtaining more scrap than its limited plant facilities could handle.

ZINC—The market was firm but quiet last week with demand for galvanizing and die casting grades most prominent. Some reports were heard that foreign zinc of prime western grade had been sold at 11.50c fas, Gulf Ports, but with respect to the domestic market prices held at 11.00c New York, and 10.50c, E. St. Louis, on prime western; 11.25c New York, and 10.75c, E. St. Louis, on brass special; 11.50c delivered on high grade.

Bureau of Mines reported last week that 5948 tons of zinc scrap were received by dealers in November with shipments to consumers totaling 6423 tons against 6195 in October.

LEAD — Supply is showing gradual improvement but continues well below demand. Sellers are holding their daily volume of business to a certain amount of metal which they set aside for disposal. Consequently daily sales have been on a more or less steady level. This policy contributes to more equitable distribution of available supply among consumers than would otherwise be possible.

Prices held unchanged at 13.00c New York, and 12.80c to 12.85c, St. Louis, on common grade; 13.10c New York, and 12.90c St. Louis, on chemical grade; 13.10c New York, and 12.90c on corroding grade.

Movement of scrap has improved and production of lead, consequently, is expected to show some gains especially in view of the higher level of prices now prevailing. About 8000 tons of lead will be released from government stockpile for February.

TIN — Office of International Trade last week returned to applicants their requests for licenses to export pig tin, explaining that such action was taken because no quota exists out of which tin may be licensed for export by the OIT. It is unlikely additional supplies will be available for distribution within the near future.

Within the past few days the Civilian Production Administration authorized the licensing of 65,000 tons of tin plate for export, this tonnage being in addition to the 55,000 tons authorized last September against first quarter allocations.

ANTIMONY—National Lead Co. last week announced quantity differentials on antimony in less than carload as follows:

	in bulk	in cases
Less than 100 lbs.	8.00c	8.50c
100 to 299 lbs.	5.50c	6.00c
300 to 499 lbs.	4.50c	5.00c
500 to 999 lbs.	3.50c	4.00c
1,000 to 1,999 lbs.	2.50c	3.00c
2,000 to 9,999 lbs.	2.00c	2.50c
10,000 to c/l	1.50c	2.00c

Base price of the RMM brand is 28.25c fob Laredo in bulk or 28.62½c in cases, and the freight in New York plus 3 per cent rail tax is 95c per 100 lbs. Distribution from the New York area will be made from the company's plant at Perth Amboy, N. J.

SILVER — Substantial buying of foreign silver for British account featured dealings in this market late last week. For three successive days London interests were buyers in the New York market and reports were that the metal was sought for immediate delivery. Domestic silversmiths and industrial users also were active in the market with the price firm at 71c an ounce for foreign metal. All newly mined domestic silver is sold to the Treasury at the fixed price of 90.50c an ounce.

NONFERROUS METAL PRICES

Copper: Electrolytic, carlots 19.50c-20.50c, del. Conn.; Lake, 19.62½c, del. Conn. Dealers may add ¾c for 5000 lb to carload; 1c, 1000-4999 lb; 1½c, 500-999 lb; 2c, 0-499 lb. Casting, 19.25c, refinery, 20,000 lb or more; 19.50c, less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 20.50c; 88-10-2 (No. 215) 24.75c; 80-10-10 (No. 305) 23.50c; No. 1 yellow (No. 405) 16.25c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than 20 tons.

Zinc: Price western 10.50c, brass special 10.75c, intermediate 11.00c, E. St. Louis; high grade 11.50c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb 0.4c; under 2000 lb 0.50c.

Lead: Common 12.80-12.85c, chemical 12.90c, corroding 12.90c, E. St. Louis for carlots.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 17.00c; No. 12 foundry alloy (No. 2 grade) 16.50c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 17.00c; grade 2 (92-95%) 16.25c; grade 3 (90-92%) 15.75c; grade 4 (85-90%) 15.50c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lb) 20.50c per lb, carlots; 22.50c 100 lb to c.l. Extruded 12-in. sticks 34.00c-38.00c.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straights), 70.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05% max. arsenic, 69.87½c; Grade C, 99.65-99.79% incl. 69.62½c; Grade D, 99.50-99.64% incl., 69.50c; Grade E, 99-99.49% incl. 69.12½c. Grade F, below 99% (for tin content), 69.00c.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 28.25c; 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 28.75c. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 9999-224 lb; and 2c for 223 lb and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked 35c lb; 25 lb pigs produced from electrolytic cathodes 36.50c lb; shot produced from electrolytic cathodes 37.50c lb; "F" nickel shots or ingots for additions to cast iron 35.50c lb. Prices include import duty.

Mercury: Open market, spot, New York, $88-$92 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be, $14.75 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.50 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.55.

Cobalt: 97-98%, $1.50 lb for 550 lb (keg); $1.52 lb for 100 lb (case); $1.57 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Indium: 99.9%, $2.25 per troy ounce.

Silver: Open market, N. Y. 70.75c per ounce.

Platinum: $58-$61 per ounce.

Palladium: $24 per troy ounce.

Iridium: $110 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass products prices based on 19.50c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 30.93c; Yellow brass 27.53c; commercial bronze, 95% 31.07c, 90% 30.56c; red brass, 85% 29.53c, 80% 29.02c; best quality 28.44c; Everdur, Duronze, Herculoy or equiv., cold-drawn, 35.79c; nickel silver, 18%, 39.82c; phosphor bronze, grade A, 5%, 48.82c.

Rods: Copper, hot rolled 27.28c, cold drawn 28.28c; yellow brass, free cutting, 22.28c, not free cutting 27.22c; commercial bronze, 95% 30.76c, 90% 30.25c; red brass, 85% 29.22c, 80% 28.71c; best quality 28.13c.

Seamless Tubing: Copper 30.97c; yellow brass 30.29c; commercial bronze 90% 32.97c; red brass 85% 32.19c, 80% 31.68c; best quality brass 30.85c.

Copper Wire: Bare, soft, fob eastern mills, carlots 25.52c, less carlots 26.02c; weatherproof, fob eastern mills carlot 26.42c, less carlots 26.92c; magnet, delivered, carlots 28.93c, 15,000 lb or more 29.18c, less carlots 29.68c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lb or more del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers: Full sheets 16.25c, 140 sq ft rolls; add per hundredweight, 25c, 80 to 140 sq ft; 50c, 20 to 80 sq ft; 75c, 10 to 20 sq ft.
Pipe: Full coils 15.50c; cut coils 15.75c.
Lead Traps and Bends: List plus 38%.

Zinc Products: Sheet, 15.50c-15.75c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 14.50c-14.75c, fob mill, 36,000 lb and over.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads, 20.00c; 5 tons and over, 25.00c; 1 to 5 tons, 21.00c; less than 1 ton, 21.50c.

Copper Anodes: In 500-lb lots, fob shipping point, freight allowed, cast oval, over 15 in., 36.87½c; flat untrimmed, 36.87½c; electro-deposited, 30.62½c.

Copper Carbonate: 52-54% metallic Cu, 250 lb barrels, nom.

Copper Cyanide: 70-71% Cu, 100-lb kegs or bbls, 41.50c fob Niagara Falls.

Sodium Cyanide: 96-98%, ½-oz balls, in 100 or 200 lb drums, 1 to 400 lb, 16.00c, 500 lb and over, 15.00c, fob Cleveland; 1 cent less, fob Niagara Falls.

Nickel Anodes: Cast and rolled carbonized, carloads, 48.00c; 10,000 to 30,000 lb, 49.00c; 30,000 to 10,000 lb, 50.00c; 500 to 3000 lb, 51.00c; 100 to 500 lb, 53.00c; under 100 lb, 56.00c; add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 22.00c; 275-lb bbls, 22.00c.

Tin Anodes: Bar, 1000 lb and over 82.50c; 500 to 1000 lb, 83.00c; 200 to 500 lb, 83.50c; less than 200 lb, 84.00c; ball, 1000 lb and over, 84.75c; 500 lb to 1000 lb, 85.25c; 200 to 500 lb, 85.75c; less than 200 lb, 86.25c, fob Sewaren, N. J.

Tin Chloride: 400 lb bbls, nom., fob Grasselli, N. J.; 100 lb kegs, nom.

Sodium Stannate: In 100 or 200 lb. drum, 49.00c; 4 to 11 kegs, 47.00c; 12 to 20 kegs, 44.30c; 21 kegs and over, 43.50c; in 350-lb bbl, 46.50c; 4 to 5 bbls, 43.80c; 6 bbls and over, 43.00c; fob Chicago, freight allowed east of Mississippi on 100 lb and over.

Zinc Cyanide: 100-lb drums, 35.00c, fob Cleveland; 34.00c, fob Niagara Falls.

Scrap Metals

BRASS MILL ALLOWANCES

Prices for less than 15,000 lb fob shipping point. Add ½c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	17.125	17.125	16.375
Yellow brass	13.750	13.250	12.875
Commercial Bronze			
95%	15.875	15.625	15.125
90%	15.750	15.500	15.000
Red brass			
85%	15.500	15.250	14.750
80%	15.375	15.125	14.625
Best Quality (71-79%)	14.625	14.375	.....
Muntz metal	12.875	12.625	12.125
Nickel silver, 5%	14.500	14.250	7.250
Phos. bronze, A. B.	18.125	17.875	16.875
Naval brass	13.250	13.000	12.500
Manganese bronze	13.250	13.000	12.375

BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 17.00, No. 2 copper 16.00, light copper 15.00, composition red brass 16.00, auto radiators 13.00, heavy yellow brass 11.50, brass pipe 12.00.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper, 18.75c; No. 2 copper, 17.25c; light copper, 16.25c; refinery brass (60% copper), per dry copper content, 15.00-15.25c.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire, No. 1 15.50-16.00; No. 2 14.50-15.00; light copper 13.50-14.00, No. 1 composition red brass 14.00-14.50, No. 1 composition turnings 13.00-13.50, mixed brass turnings 9.50-10.00, new brass clippings 13.00-13.50, No. 1 brass rod turnings 11.75-12.25, light brass 8.00-8.50, heavy yellow brass 10.00-10.50, new brass rod ends 12.00-12.50, auto radiators, unsweated, 11.00-11.50, clean red car boxes 12.50-13.00, cocks and faucets 11.75-12.00, brass pipe 11.50-11.75.

Lead: Heavy lead 11.25-11.50, battery plates 6.50-6.75, linotype and stereotype 13.50-14.00, electrotype 11.50-12.00, mixed babbitt 12.00-12.50, solder joints 13.50-14.00.

Zinc: Old zinc 5.50-6.00, new die cast scrap 5.50-6.00, old die cast scrap 4.00-4.50.

Tin: No. 1 pewter 44.00-45.00, block tin pipe 60.00-62.00, auto babbitt 35.00-36.00, No. 1 babbitt 35.00-38.00, siphon tops 38.00-40.00.

Aluminum: Clippings, 2S, 9.50-10.00, old sheets 7.50-7.75, crankcases 7.50-8.00, turnings 4.00-4.25, pistons, free of struts, 6.75-7.00.

Nickel: Anodes 19.50-20.50, turnings 16.50-17.50, rod ends 19.00-20.00.

Monel: Clippings 14.00-15.00, turnings 9.00, old sheet 12.00-13.00, rods 12.50-13.00, castings 10.00.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

***PITTSBURGH:**

No. 1 Heavy Melt. Steel	$32.50
No. 2 Heavy Melt. Steel	32.50
No. 1 Busheling	32.50
Nos. 1, 2 & 3 Bundles	32.50
Machine Shop Turnings	27.50-28.00
Mixed Borings, Turnings	27.50-28.00
Short Shovel Turnings	29.00-29.50
Cast Iron Borings	28.50-29.00
Bar Crops and Plate	35.00-36.00
Cast Steel	37.00-37.50
Punchings & Plate Scrap	37.00-37.50
Elec. Furnace Bundles	35.00-36.00
Heavy Turnings	32.00-33.00
Alloy Free Turnings	29.00-29.50
Cut Structurals	35.00-36.00
No. 1 Chemical Borings	32.00-35.00
Tin Can Bundles	28.50-29.50

Cast Iron Grades

No. 1 Cupola	42.00-43.00
Charging Box Cast	40.00-41.00
Heavy Breakable Cast	35.00-36.00
Stove Plate	39.00-40.00
Unstripped Motor Blocks	38.00-39.00
Malleable	41.50-42.00
Brake Shoes	33.00-34.00
Clean Auto Cast	43.00-44.00
No. 1 Wheels	40.00-41.00
Burnt Cast	35.00-36.00

Railroad Scrap

No. 1 R. R. Heavy Melt	32.50
R R Malleable	41.50-42.00
Axles	40.00-41.00
Rails, Rerolling	38.00-39.00
Rails, Random Lengths	38.00-39.00
Rails, 3 ft and under	41.50-42.50
Rails, 18 in. and under	42.00-43.00
Railroad Specialties	36.00-37.00
Uncut Tires	36.00-37.00
Angles, Splice Bars	38.00-39.00

* Prices for steelmaking grades from remote points range up to $38, including $7 to $8 freight.

CLEVELAND:

No. 1 Heavy Melt. Steel	$32.50
No. 2 Heavy Melt Steel	32.50
No. 1 Busheling	32.50
Nos. 1 & 2 Bundles	32.50
Machine Shop Turnings	25.00
Mixed Borings, Turnings	26.00
Short Shovel Turnings	26.00
Cast Iron Borings	26.00
Bar Crops and Plate	35.00
Cast Steel	35.00
Punchings & Plate Scrap	35.00
Elec. Furnace Bundles	32.50
Heavy Turnings	30.00-32.50
Alloy Free Turnings	27.00
Cut Structurals	34.50
No. 1 Chemical Borings	27.00

Cast Iron Grades

No. 1 Cupola	43.00-45.00
Charging Box Cast	41.00-42.00
Heavy Breakable Cast	45.00
Stove Plate	39.00-40.00
Unstripped Motor Blocks	42.00
Malleable	44.00-46.00
Brake Shoes	30.00
Clean Auto Cast	45.00
No. 1 Wheels	38.00
Burnt Cast	34.00

Railroad Scrap

No. 1 R. R. Heavy Melt	32.00
R. R. Malleable	45.00
Rails, Rerolling	35.00-36.00
Rails, Random Lengths	38.00-39.00
Rails, 3 ft and under	39.00
Railroad Specialties	30.50
Uncut Tires	36.50
Angles, Splice Bars	28.50

VALLEY:

No. 1 Heavy Melt. Steel	$32.50-34.00
No. 2 Heavy Melt. Steel	32.50-34.00
No. 1 Bundles	32.50-34.00
Machine Shop Turnings	28.00
Short Shovel Turnings	28.50
Cast Iron Borings	28.50

Railroad Scrap

No. 1 R. R. Heavy Melt	32.50

MANSFIELD:

Machine Shop Turnings	$26.00
Short Shovel Turnings	28.00

CINCINNATI:

No. 1 Heavy Melt. Steel	$30.50
No. 2 Heavy Melt. Steel	30.50
No. 1 Busheling	30.50
No. 1 Bundles	30.50
No. 2 Bundles	30.00
Machine Shop Turnings	23.50
Mixed Borings, Turnings	22.00
Short Shovel Turnings	25.00
Cast Iron Borings	23.50

Cast Iron Grades

No. 1 Cupola Cast	41.00
Charging Box Cast	32.00
Heavy Breakable Cast.	33.00
Stove Plate	29.00
Unstripped Motor Blocks	30.00
Brake Shoes	28.00
Clean Auto Cast	40.00

Railroad Scrap

No. 1 R.R. Heavy Melt	30.50
R.R. Malleable	37.00
Rails, Rerolling	36.00
Rails, Random Lengths	36.00
Rails, 18 in. and under	40.00

DETROIT:

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$27.00-27.50
No. 1 Busheling	27.00-27.50
Nos. 1 & 2 Bundles	27.00-27.50
No. 3 Bundles	25.00-25.50
Machine Shop Turnings	20.00-20.50
Mixed Borings, Turnings	20.00-20.50
Short Shovel Turnings	22.00-22.50
Cast Iron Borings	22.00-22.50
Punchings & Plate Scrap	28.50-30.50
Elec. Furnace Bundles	30.50

Cast Iron Grades

No. 1 Cupola Cast	35.00-37.00
Heavy Breakable Cast.	28.00-30.00
Clean Auto Cast	35.00-37.00

BUFFALO:

No. 1 Heavy Melt. Steel	$32.00-34.00
No. 2 Heavy Melt. Steel	30.00-32.00
No. 1 Busheling	30.00-32.00
Nos. 1 & 2 Bundles	30.00-32.00
No. 3 Bundles	28.00
Machine Shop Turnings	20.50-21.50
Mixed Borings, Turnings	20.50-21.50
Short Shovel Turnings	22.00-23.00
Cast Iron Borings	21.50-22.50
Cast Steel	27.00
Punchings & Plate Scrap	33.00-34.00
Elec. Furnace Bundles	28.50
Heavy Turnings	22.50
Alloy Free Turnings	23.00
Cut Structurals	28.50
No. 1 Chemical Borings	22.75

Cast Iron Grades

No. 1 Cupola Cast	35.00-40.00
Charging Box Cast	31.00-35.00
Stove Plate	33.00-38.00
Malleable	34.00-38.00
Clean Auto Cast	38.00
No. 1 Wheels	32.75-33.25

PHILADELPHIA:

No. 1 Heavy Melt. Steel	$33.50-34.00
No. 2 Heavy Melt. Steel	33.50-34.00
No. 1 Busheling	33.50-34.00
Nos. 1 & 2 Bundles	33.50-34.00
No. 3 Bundles	31.00-31.50
Machine Shop Turnings	25.00
Mixed Borings, Turnings	25.00
Short Shovel Turnings	25.00
Cast Iron Borings	25.00
Bar Crops and Plate	36.00
Cast Steel	36.00
Punchings & Plate Scrap	36.00
Elec. Furnace Bundles	35.00
Heavy Turnings	33.00-33.50
Cut Structurals	36.00
No. 1 Chemical Borings	31.50-32.00

Cast Iron Grades

No. 1 Cupola Cast	45.00-46.00
Charging Box Cast	43.50-44.00
Heavy Breakable Cast	43.50-44.00
Unstripped Motor Blocks	41.50
Malleable	45.00-46.00
Clean Auto Cast	45.00-46.00
No. 1 Wheels	44.00-45.00

NEW YORK:

(Dealers buying prices, fob shipping points)

No. 1 Heavy Melt. Steel	$30.00-30.50
No. 2 Heavy Melt. Steel	30.00-30.50
No. 1 Busheling	30.00-30.50
Nos. 1 & 2 Bundles	30.00-30.50
No. 3 Bundles	28.00-28.50
Machine Shop Turnings	22.00
Mixed Borings, Turnings	22.00
Short Shovel Turnings	24.00
Punchings & Plate Scrap	32.00
Elec. Furnace Bundles	31.00
Cut Structurals	32.00
No. 1 Chemical Borings	23.00-24.00

Cast Iron Grades

No. 1 Cupola Cast	39.50-40.00
Charging Box Cast	37.50-38.00
Unstripped Motor Blocks	34.50
Malleable	40.00-41.00

BOSTON:

(Fob shipping points)

No. 1 Heavy Melt. Steel	$29.00-30.00
No. 2 Heavy Melt. Steel	29.00-30.00
No. 1 Busheling	28.00-29.00
Nos. 1 & 2 Bundles	28.00-29.00
No. 3 Bundles	25.00-26.00
Machine Shop Turnings	21.00-22.00
Mixed Borings, Turnings	20.00-21.00
Short Shovel Turnings	23.00-24.00
Cast Iron Borings	20.00-21.00
Bar Crops and Plate	29.35
Cast Steel	29.35-29.85
Punchings & Plate Scrap	29.35-29.85
Elec. Furnace Bundles	29.35
Heavy Turnings	26.35
Alloy Free Turnings	25.35
Cut Structurals	28.85
No. 1 Chemical Borings	23.00-24.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-44.00
Charging Box Cast	36.00-38.00
Heavy Breakable Cast.	42.00-44.00
Stove Plate	39.00-40.00
Clean Auto Cast	38.00-40.00

CHICAGO:

No. 1 Heavy Melt. Steel	$30.00
No. 2 Heavy Melt. Steel	30.00
Nos. 1 & 2 Bundles	30.00
No. 3 Bundles	28.00
Machine Shop Turnings	25.00
Mixed Borings, Turnings	25.00
Short Shovel Turnings	27.00
Cast Iron Borings	26.00
Bar Crops and Plate	31.50-35.00
Cast Steel	31.50-35.00
Punchings	35.00
Elec. Furnace Bundles.	31.50-35.00
Heavy Turnings	28.00-30.00
Cut Structurals	30.00-33.50

Cast Iron Grades

No. 1 Cupola Cast	40.00-45.00
Malleable	40.00-45.00
Clean Auto Cast	35.00-40.00

Railroad Scrap

No. 1 R. R. Heavy Melt	31.00
Rails, Rerolling	38.00-39.00
Rails, Random Lengths	37.00-38.00
Rails, 3 ft. and under	40.00-41.00
Rails, 18 in. and under	41.00-42.00
Railroad Specialties	37.00-39.00
Angles, Splice Bars	36.00-38.00

ST. LOUIS:

No. 1 Heavy Melt. Steel	$32.25-33.00
No. 2 Heavy Melt. Steel	32.25-33.00
Machine Shop Turnings	27.25-27.75
Short Shovel Turnings	29.25-29.75

Cast Iron Grades

(Fob shipping point)

No. 1 Cupola Cast	35.00-37.00
Charging Box Cast	30.00-35.00
Heavy Breakable Cast	30.00-32.00
Stove Plate	29.00-34.00
Brake Shoes	28.75-31.00
Clean Auto Cast	35.00-37.00
No. 1 Wheels	34.50-36.50
Burnt Cast	25.00-30.00

Railroad Scrap

R.R. Malleable	41.00-42.00
Rails, Rerolling	40.00-42.00
Rails, Random Lengths	37.00-40.00
Rails, 3 ft. and under	40.00-43.00
Uncut Tires	34.50-36.50
Angles, Splice Bars	37.00-38.00

BIRMINGHAM:

No. 1 Heavy Melt. Steel	$27.50-28.00
No. 2 Heavy Melt. Steel	27.50-28.00
No. 1 Busheling	27.50-28.00
Nos. 1 & 2 Bundles	27.50-28.00
No. 3 Bundles	27.50-28.00
Machine Shop Turnings	21.00-21.50
Mixed Borings, Turnings	23.00-23.50
Short Shovel Turnings	23.00-23.50
Cast Iron Borings	21.00-21.50
Bar Crops and Plate	31.00-31.50
Punchings & Plate Scrap	31.00-31.50
Cut Structurals	31.00-32.50
No. 1 Chemical Borings	21.00-21.50

Cast Iron Grades

No. 1 Cupola Cast	37.50-38.00

Railroad Scrap

No. 1 R.R. Heavy Melt	29.50-30.00
R.R. Malleable	37.50-38.00
Rails, Rerolling	33.00-33.50
Rails, Random Length.	30.00-30.50
Rails, 3 ft. and under	32.50-33.00
Rails, 18 in. and under.	33.50-34.00
Angles and Splice Bars	33.50-34.00

SAN FRANCISCO:

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Busheling	19.50
Nos. 1 & 2 Bundles	19.50
No. 3 Bundles	10.00
Machine Shop Turnings	8.00
Bar Crops and Plate	18.00
Cast Steel	18.00
Alloy Free Turnings	8.00
Cut Structurals	20.00-20.50
Tin Can Bundles	17.00

Railroad Scrap

Axles	26.50
Rails, Random Lengths	21.00
Uncut Tires	23.00

SEATTLE:

No. 1 Heavy Melt. Steel	$19.00
No. 2 Heavy Melt. Steel	19.00
No. 1 Busheling	19.00
Nos. 1 & 2 Bundles	19.00
No. 3 Bundles	17.00
Machine Shop Turnings	11.50
Mixed Borings, Turnings	11.50
Punchings & Plate Scrap	21.50
Cut Structurals	21.50

Cast Iron Grades

No. 1 Cupola Cast	27.50
Charging Box Cast	22.50
Heavy Breakable Cast.	21.50
Stove Plate	25.50
Unstripped Motor Blocks	21.50
Malleable	27.50
Brake Shoes	27.50
Clean Auto Cast	27.50
No. 1 Wheels	24.00

Railroad Scrap

No. 1 R. R. Heavy Melt	20.00
Railroad Malleable	27.50
Rails, Random Lengths	20.00
Angles and Splice Bars	21.50

LOS ANGELES:

No. 1 Heavy Melt. Steel	$16.50
No. 2 Heavy Melt Steel	15.50
Nos. 1 & 2 Bundles	14.50
Machine Shop Turnings	8.00
Mixed Borings, Turnings	8.00

Cast Iron Grades

No. 1 Cupola Cast	30.00

The New Miracle Finish

IRCO-Seal

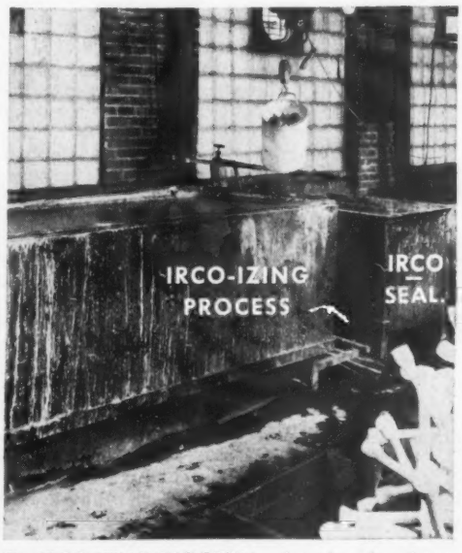
- **The IRCO-IZING PROCESS plus IRCO-SEAL is a complete metal preparation and finish in one operation.**

IT SAVES COST AND LABOR • EASILY SET-UP • SIMPLE TO MAINTAIN • IRCO-SEAL CAN BE DIPPED OR SPRAYED.

After the metal emerges from the IRCO-IZING bath, *it need not be dried* before application of IRCO-SEAL.

IRCO-SEAL is a satin-like organic finish, durable, *will not clog threads*, and dries rapidly.

- Above are some articles finished with IRCO-SEAL (Note the smooth finish and unclogged threads) 300 HOUR SALT SPRAY RESISTANCE



The IRCO-IZING PROCESS is a hot zinc phosphate treatment for iron, steel, zinc and cadmium, providing a rust inhibiting phosphate base for all finishes.

IRCO-SEAL is immediately available in the following colors:

- **Bright metallic** (Replaces Plating)
- **Brown**
- **Mahogany**
- **Blue**
- **Black**

INTERNATIONAL RUSTPROOF CORPORATION

CLEVELAND OHIO

Sheets, Strip . . .

Price of cold-finished spring steel advanced to 3.20c, Cleveland and Pittsburgh

Sheet & Strip Prices, Page 158

Pittsburgh — Carnegie-Illinois Steel Corp. has followed other producers in revising stainless steel price bases, dropping the odd decimals resulting from 8.2 per cent increase granted under OPA and has issued a new extra card incorporating substantial upward revisions in gage and finish, length, width and other extras. A price revision in cold-finished spring steel is expected to be announced momentarily here. Another large producer hopes to have new prices out on cold-rolled alloy strip this week. American Steel & Wire Co. is limiting Cleveland to a price base on hot-rolled strip within the range ¾-in. to 3⅛-inch wide by .035 to .075-inch thickness.

Cleveland—Cold-finished spring steel prices have advanced to the basis of 3.20c, Pittsburgh and Cleveland, for 0.26-0.40 carbon grade. The Worcester base is 0.20c higher.

Philadelphia—While some sheet consumers have been advised as to what they may expect to receive in the next quarter, others have not been so informed and consequently they are pressing their suppliers for information. It is clear though that quotas generally will be far short of what is desired. Many see no improvement, in fact, for some months to come and are endeavoring to revise their plans accordingly as they have been forced to do on several previous occasions.

New York — While sheet consumers have revised their specifications where possible to lessen the burden imposed by recent extras, most of the revisions particularly by jobbers, have been with respect to packaging and marking. In the case of marking, for instance, many distributors have ceased having this done entirely, thus saving the $3 a ton extra that is now being imposed by the mills. Previously this had been done by the mills free of charge and jobbers availed themselves of this service quite generally, especially with regard to the marking of galvanized sheets.

While some producers estimate that they will be fairly well caught up on arrearages by the end of this quarter, due to limited quotas, there are others who estimate that they will be in about as bad position as ever, and whatever buyers will receive in second quarter under allotments, it will be far short of what they would like to receive. Demand well in excess of supply is expected to continue for months, certainly well into next year.

Cincinnati—Sheet mills, working on second quarter quotas and schedules, are withholding until completion of the task any surmise on allocations. It appears certain, however, that the carryover will be much lighter than at the start of the new year. Clamor for sheets is unabated, indicating tonnage will continue far short of the demand. Production is holding at high levels.

Boston — Shortage of hot-rolled strip for cold reduction is most pronounced in low-carbon grades. Alloy and high-carbon strip deliveries are maintained closer to quota schedules. As in some chain requirements, this is resulting in changes in specifications to alloys, consumers paying higher prices to get cold-rolled steel. Revisions in carbon ranges for cold strip will effect several tonnage grades, including shoe shank steel. Formerly shoe shanks were of 0.60 carbon, but later 0.50 carbon. This grade now falls in the 0.40-0.60 carbon range, taking that extra. Heavy carryovers are affecting second quarter narrow cold strip quotas, limiting new tonnage for that period while some producers are taking orders for certain grades without definite second quarter delivery promise. Substantial volume of orders is still held on file awaiting second quarter scheduling.

Birmingham—Sheets remain in phenominally big demand throughout this territory. Production holds at capacity but is not able to keep pace with demand. Considerable small industry expansion would develop in the district were the sheet supply situation improved.

St. Louis—Pressure for steel sheets continues to rise under the impetus of demand created by withdrawal of eastern suppliers from this district. Higher freight rates, which have been cutting off buyers from eastern sources, are having a cumulative effect of further overloading sheet mills here which have been attempting vainly to reduce order backlogs. Demand is five times mills' capacity. Rolling schedules are filled seven months for hot-rolled sheets and eight months for cold. Books have been closed since last March and some 1945 orders are only now being shipped.

Pig allocations to the leading steel mill were cut back 30 per cent in Janu-

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ary and 50 per cent in February, with the result the firm is obliged to reject new rated steel orders. Granite City Steel Co. last week blew in the last of three leased DPF furnaces, raising its current weekly rate to 11,000 net tons as compared to 17,277 total capacity.

Steel Bars . . .

Second quarter books opened on carbon bars . . . Rail steel bar prices show wide range

Bar Prices, Page 158

Philadelphia — Carbon bar sellers are beginning to open books for the second quarter and where they have not done so they are being besieged by their customers as to when they will be opened. Pressure for most all of the carbon sizes is as heavy as at any time in recent weeks. With consumers still restricted in their operations because of unbalanced stocks, only in alloy bars is their position, on an average, anywhere near comfortable.

Pittsburgh—There is a wide range in rail steel bar prices ($2.60 to $2.95 per 100 pounds) at various price bases, due in part to unsettled scrap market. Rail steel bars now are sold on a 10 ton base and carry same quantity extras as merchant carbon bars although size extras are $1 a ton less. As in other steel products, producers of rail steel bars are avoiding as much freight absorption as possible. Sweet's Steel Co., Williamsport, Pa., for example, is selling rail steel bars at $2.95 on only the Pittsburgh and Buffalo prices base.

Cold-finished bar producers in this district are selling on the Chicago base only for West Coast delivery. Columbia Steel Co. has established a base delivered price on merchant carbon bars of $3.33, San Francisco, and $3.325, Los Angeles, for range of sizes produced. The spread in base delivered prices on West Coast between merchant and reinforcing bars is 30 cents, compared with difference of 15 cents at eastern price bases.

Kaiser Co. Inc. has established the following delivered West Coast prices at San Francisco and Los Angeles: Plates, $3.46 per 100 lb in thickness from 3/16 to 2 in. and in width from 48 to 96 in.; merchant bars, $3.56 from 3/4 to 6 in. in rounds and squares and full range in flats: shapes, $3.41: hot-rolled strip, $3.41; hot-rolled sheets, $3.38; alloy spring steel flats, $3.9165, Los Angeles only.

New York—By the end of this week, it is believed, most bar producers, selling on a quarterly basis, will have set up their quotas for next quarter. On all carbon grades the outlook is for slightly better allotments, as producers over recent weeks have been endeavoring to restrict shipments on new commitments so as to get fairly caught up on the old; however, there will undoubtedly be exceptions and, in any event, consumers will not obtain anything like as much as they would like to have. Only in alloy bars does the situation appear easy and, as a matter of fact, that has been the case for months. In some quarters small lots of hot alloy bars can still be had for March shipment.

Boston — Carbon bar quotas for the second quarter are limited in small sizes and overall tonnage will about equal that of the first quarter. This, for larger rounds and heavier flats and squares, as well as alloys, will be sufficient for most consumers. Forge shops continue to press strongly for more tonnage with the high level of industrial operations keeping inventories down. In scattered instances, distributors seeking a possibility of better delivery have revised specifications to special bar quality without much success, although basic changes in specifications to avoid extras is not a factor. Most consumers are centering on loading, marketing and packaging changes to duck these extras and they generally are also taking five-ton lifts.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 158

Pittsburgh — Output of concrete reinforcing bars remains restricted and well below potential demand. Some mills have reduced order backlogs in recent months, but only because they restrict new business. New demand continues heavy, with some jobs over 1000 tons noted.

Reflecting buoyant scrap market, a wide range in rail steel reinforcing bar prices, between $2.60 and $2.95 per 100 pounds, recently has developed. Columbia Steel Co. has established a base delivered price on concrete bars of $3.03 at San Francisco and $3.025 Los Angeles, for range of sizes produced.

Carnegie-Illinois Steel Corp. is not recognizing Detroit, Toledo and Eastern Michigan arbitrary delivered prices on concrete bars.

TAM Zirconite Prices Advance as of Feb. 1

Effective Feb. 1, TAM zirconite prices, advanced to the following levels in cents per pound, fob Suspension Bridge, N. Y., in carload lots of 80,000 pounds: Sand, 3.75c; flour, 4.75c; wash, 5.25c.

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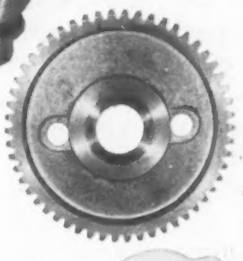

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Plates . . .

Plate Prices, Page 159

Boston — Any early relief from the shortage of light gage plates is overshadowed by increased railroad requirements over the balance of this year. Carbuilding needs will begin to bite heavier into plate quotas next quarter and new tonnage quotas for that period are already curtailed by carryovers. Some producers have been unable to make the expected dent in these carryovers because of low gas pressures. Plate fabricators and warehouses are short of plates, notably small tank builders. For the car building program, bottlenecks are expected to be greater in casting, wheels and axles, although the plate tonnage to be drawn off from other consumers will be serious.

New York—Pressure for plates, particularly in the light gages, has never been heavier. There was greater demand during the war, especially when the shipyards were highly active, but at that time there was far greater capacity, what with the use of the strip mills in turning out plates. Plate production during the war years got up to around 1,200,000 tons per month, but since then strip capacity has been devoted almost entirely to sheets and strip and actual production of plates has dropped to possibly 550,000 tons or a little less so that demand in relation to output is still exceedingly tight.

Some producers have found themselves well oversold and consequently are cutting back on their commitments. In some of the lighter gages consumers have had their allotments cut as much as 50 per cent. Stringency in plates has recently been further accentuated by the voluntary action being planned by producers at the urgent request of the government to step up their shipments to car builders.

Present shortage of plates is being reflected in reduced operations among tank makers, locomotive builders and, in fact, in most lines. Structural fabricators claim they are having difficulty in maintaining operating schedules because of their inability to get plates.

Chicago — Plate mills in this district will contribute their share of material required by railroad car builders to execute the program of accelerated domestic car building to be undertaken during the last three quarters of this year. Although individual mill tonnages do not seem large, they will be disturbing to schedules which are already cramped, and since overall production can not be expanded much some consumers other than car builders are going to suffer delay in receiving some of the plates they have on order. It is understood A. O. Smith has found a western mill willing to produce several thousand tons of plates for a new pipe line into St. Louis for Laclede Gas Co. However, it is said the commitment is conditioned on the plate maker being given pig iron above its present allocation. In view of the shortage of iron, there is some question as to whether this condition can be fulfilled.

Birmingham—Fabricators are accounting for a major tonnage of plates in this territory, much of it going into railroad bridges and other structural items. Demand for plates from tank manufacturers holds steady, as it does for shipbuilding and repairs. Mills continue greatly behind on their schedules.

Seattle—Plates are in good demand, particularly light gages for small tanks. Shops have fair backlogs and are operating steadily although handicapped by mill allocations of materials. Local plants have declined some large projects because of uncertain completion dates. No major tonnages are pending but there is a good run of small orders.

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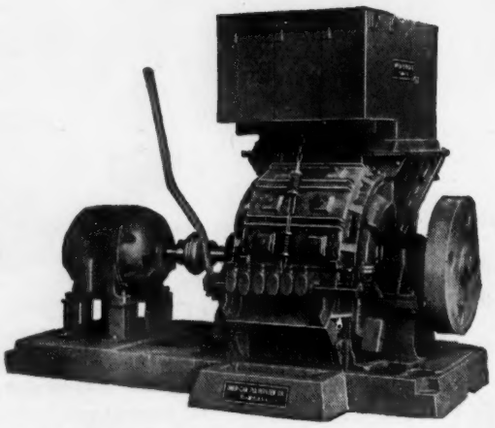

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Structural Shapes . . .

Structural Shape Prices, Page 159

New York—Structural contracts continue spotty, although there is a steady accumulation of new inquiry. One factor for delay is the extended delivery promises most fabricators are offering, but probably the most important consideration is uncertainty with respect to the future trend in prices. It is believed that once builders are convinced that prices have become stabilized there will be a rush of activity, notwithstanding, the extended delivery promises in many cases.

One feature of current inquiry is increased volume of bridge work for various states in the east. Most inquiries are small; nevertheless the total tonnage is fairly impressive. A number of these jobs have been in the market before and only now are being re-advertised for the first time in several months. The largest to be placed recently is a Connecticut state bridge involving 5835 tons, noted in last week's issue as going to the American Bridge Co., Pittsburgh. No action, however, on the 2000 to 3000

tons of piling for this project has been reported.

Boston—High costs are slowing down structural demand and new inquiry is light. Fabricated structural steel in place is frequently quoted around 15.00 cents per pound and in some instances higher. Small projects generally are estimated at warehouse prices and considerable steel to round out tonnage emanates from distributors but margins on plain material in addition to fabricating and erecting are above average. Some district fabricating shops have been taking contracts for tonnage in excess of mill quotas and rounding out balance from warehouse. Second quarter quotas are higher with one eastern supplier, but the stringency in smaller sizes will continue for some months at least.

Seattle—Rolling mills are reducing backlogs. New business is mainly emergency or orders for regular customers. Several projects involving major tonnages have been postponed due to unexpected high costs. Fabricating plants are making the best of a bad situation due to insufficient allocations of materials and slow deliveries. One local plant has been advised that April allotments have been blanked out, but meanwhile delayed shipments are arriving. Inventories are practically exhausted and it is inadvisable to bid on large projects due to the uncertainty of meeting time schedules.

Wire . . .

Wire Prices, Page 159

Pittsburgh—American Steel & Wire Co. has eliminated Cleveland as a price base on merchant trade items, with exception of nails, annealed and galvanized merchant wire and weaving wire. A price base on nails of $3.85 (or 10 cents above most other price bases) has been established at Cleveland. Fence posts are now based only at Duluth by AS&W at column 90.

Cleveland — Effective as of Jan. 27, bead wire, 0.037 bright, advanced $1.25 per 100 pounds to $9.45, Cleveland, Pittsburgh and Chicago.

Chicago—Consumers of manufacturers wire are exerting strong pressure on mills for material beyond that which has been allocated to them, but are meeting slim success. Carryover tonnage from 1946 prevents treatment more generous than has been accorded. Backlogs for construction materials, including wire rope and electrical wire, are very heavy. Buyers in southern areas are exceedingly active in trying to speed shipments of merchant products. Heavy consumption prevents jobbers from maintaining workable inventories.

Boston — With the opening of books for the second quarter, wire mills are far apart as to tonnage available and delivery positions of many products. The rod supply is the center of the confusion. Outlook for an increase in wire tonnage for most consumers is doubtful. Inventories with industrial users are unbalanced and in efforts to stretch supply over as wide a range of products as possible, most fabricators are restricting acceptance of orders for some wire fabricated parts and materials, notably screws and fastenings. While low-carbon drawn wire is especially affected by lack of rods, some mills drawing specialties are also badly in need of semifinished material. This is causing production curtailments and layoffs in some instances. Meanwhile, demand for wire for the automobile trade is high and most other consuming industries are asking for much larger tonnages than ever before.

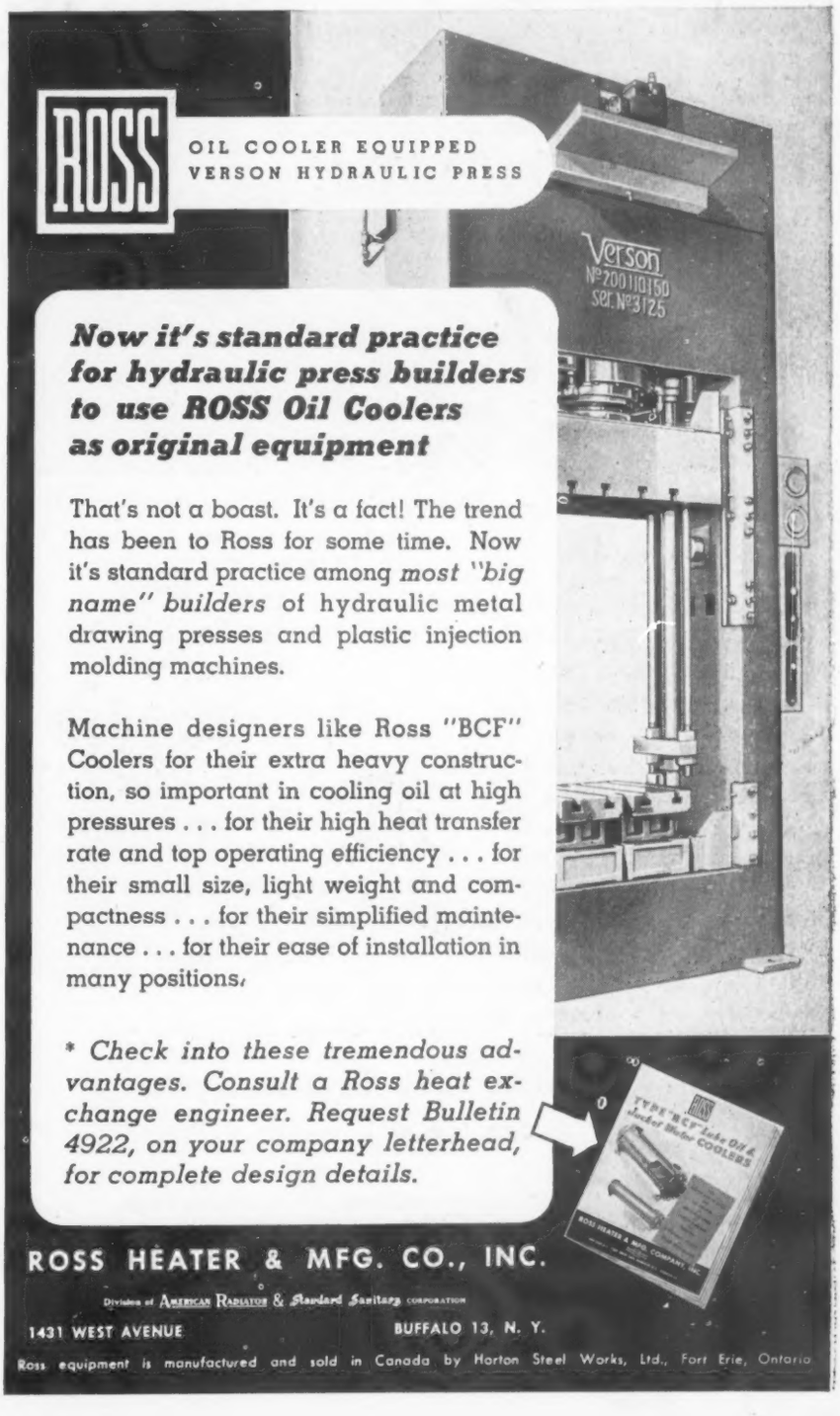
Columbia Steel Co. has established the following base delivered prices on wire products at San Francisco: Bright basic manufacturers wire, $4.31 per 100 pounds; merchant quality wire annealed $4.96, galvanized $5.41; MB spring wire, $5.63; black premier spring wire, $5.28; barbed wire, column 114; woven fence, 107; bale ties 110; wire rods, $3.27; and nails (standard, cement coated and galvanized) $4.83.

Birmingham—Reports indicate drawn wire is in somewhat better supply generally, probably due to a slackening in demand for barbed wire and wire fencing because of seasonable conditions. Jobbers, however, report not a great deal of improvement in supply of such major items as nails, fencing and barbed wire and retailers are being supplied on quota basis as far as stocks last.

Tubular Goods . . .

Tubular Goods Prices, Page 159

Boston—As the New England town meeting period, about to begin, is usually followed by a wave of cast iron pipe buying, delivery on much of this tonnage for installation this year fades. Cast pipe foundries are quoting ten months and beyond on current inquiries and are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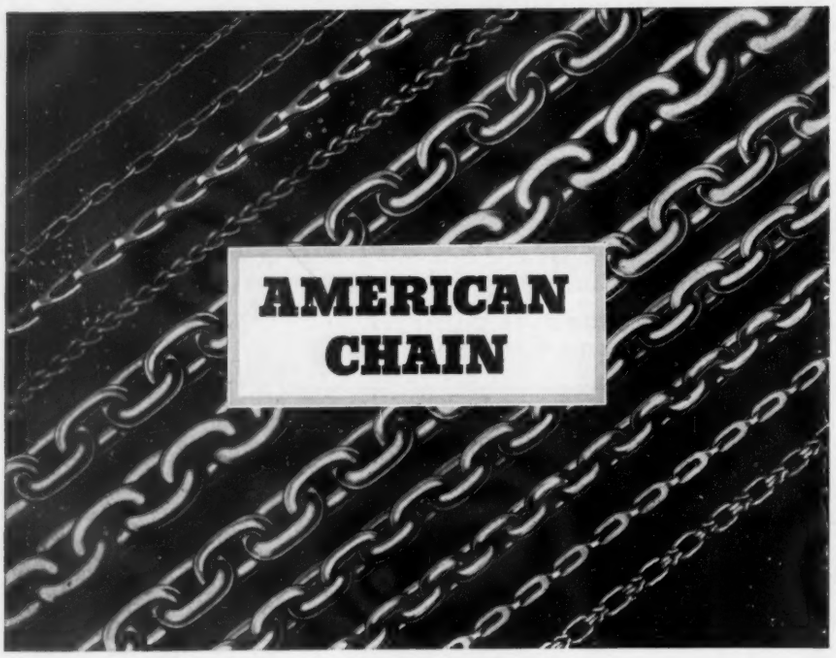

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behind shipment on previous contracts. Currently, demand for cast pipe is seasonally slow, but quotations are few. Wrought pipe demand is active with distributors getting slightly more tonnage. Steel pipe quotas to jobbers are being met in most instances, but little is left for direct shipments. Plumbing and heating wholesalers are checking inventories closer in many instances.

Pittsburgh — Price base on standard lap weld pipe is restricted from 3 to 8 in. at Gary; for extra strong, 3 to 6 in. For sizes below or above this range, the Pittsburgh price base is quoted. Seamless and line pipe in size range of 2 to 24 in. is produced at Pittsburgh and Lorain. Producers are booked ahead 6 to 8 months on seamless hot and cold-drawn tubing in size range 3 in. and smaller; larger sizes are available on fairly prompt delivery, while 3 to 4 months' backlog is reported for alloy and stainless. Standard pipe producers are booked through 1948 in some instances.

St. Louis — Pipe production here is booked eight months ahead with mills facing greater lags under a growing scarcity of pig iron and scrap. Pipe makers' scrap piles are under 30 days and they are running hand-to-mouth on pig. Demand recently has been boosted by housing projects. Some new pressure from users formerly buying in the east also is noted.

Seattle—Long-term deliveries are a serious handicap in the cast iron pipe market. Demand is insistent but in many instances important projects have been postponed until the situation is more favorable. As an illustration, Spokane has awarded 750 tons bell and spigot to Hughes & Co., for Pacific States Cast Iron Pipe Co., at $94,140, delivery 150 to 200 days. The low bid was not accepted as delivery was specified as 21 months.

Pig Iron Premium Payment Plan Extension Approved

Continuation to June 30, 1947, of premium payments on foundry and malleable pig iron has been approved by the Joint Pig Iron Industry Advisory Committee, the Civilian Production Administration and the Office of Housing Expediter.

The plan, effective since Sept. 1, 1946, is designed to stimulate production of iron for needed housing products. It provides for premiums of $8 to $12 per ton on all foundry and malleable grades produced above quota. Quotas were established generally at 80 per cent of the best production month in the January-August 1946 period, or the best 3-month span in the same period.

Combined production of plants participating increased an average of 48,800 tons monthly in the September-November period over the three months prior. The overall increase in the industry, including both participating and non-participating plants, was 4.4 per cent in September and 8.9 in October, the latter a peak for 1945-46. In November, the daily average production was higher than during any of the eight months of 1946 prior to the premium plan. Office of the Housing Expediter, in a review of the first three months' operation of the plan, showed that independent producers increased production over the previous three months by

an average of 8900 tons monthly; integrated producers by a 17,500-ton monthly average, and reopened furnaces by a 22,400-ton monthly average.

Government officials have suggested changing production quotas above which premiums are paid. No definite decision has been reached but it is indicated an increase might be effected at about 12 per cent above the present 80 per cent level. It is pointed out that quotas originally were based on conditions before price decontrol and that some of these conditions have changed. Also, it is said, a preliminary survey of the plan's operation shows the possibility that payments to independent or merchant plants would be disproportionately high in relation to their production increases if the plan remains unchanged.

Pig Iron . . .

Pig Iron Prices, Page 160

New York — District pig iron consumers report little betterment in shipments, with receipts running far behind requirements, except in cases where foundries are engaged in priority work, and these foundries represent the minority. Inadequate coke shipments also constitute an operating problem.

Philadelphia—Pig iron consumers, operating without benefit of priorities, are at least partially resigned to the prospect of continued difficulties in getting tonnage over the remainder of this quarter. They are very much concerned as to what the outlook will be in the period following. These consumers represent the vast majority and feel that the extent of restrictions on their allotments in favor of those engaged in work regarded by Washington as essential to the housing program is creating an unwarranted hardship. They are anxious to see the end of it, or at least revision in policy.

Chicago—Foundries continue unable to obtain sufficient iron to maintain melting operations anywhere near capacity level and are progressively falling behind on delivery promises for castings. A criticism of the priority system is that too much emphasis is being placed on hot metal and pig iron for steelmaking and not enough on merchant iron. At present, some manufacturers are obtaining steel faster than castings, which is restricting production schedules and resulting in excess steel inventories.

Boston—Gradual improvement in pig iron supply is not uniform. Some melters are increasing ratio of iron in melts with cast scrap costing over $40 a ton, while others strive to increase melt with unchanged ratio. Additional foreign iron, reported from Poland, has been imported at around $74, Boston. Larger melters still need iron, including some in the textile mill equipment field. However, with 15,000 tons of foundry and malleable iron earmarked for New England each month, this area is probably better off now as to supply than many others with further improvement likely. This is not applicable to basic iron, the supply of which to most consumers is critical. Shipments from Buffalo and other outside furnaces will continue restricted this month. There are no foundries down for lack of iron, but, if iron were available, melt of standard grades might well be 20,000 tons monthly, or nearly one-quarter higher than the prewar normal consumption.

Pittsburgh — No immediate price in-

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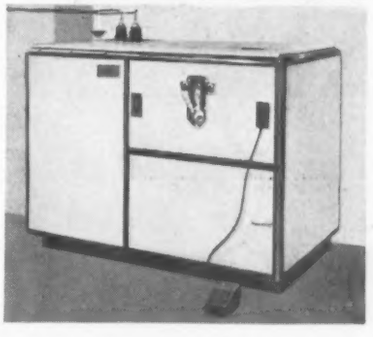

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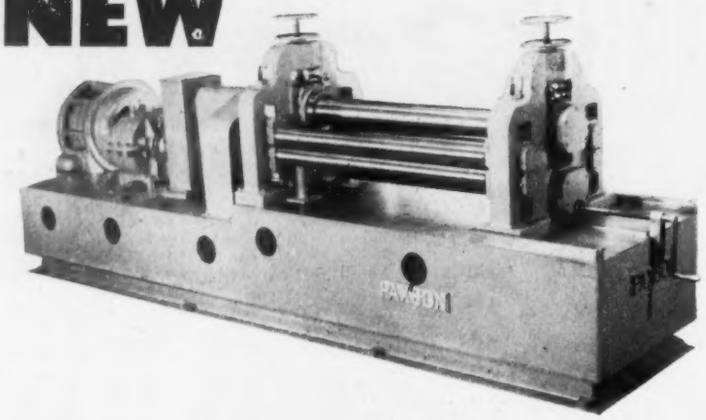

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crease is contemplated by lone merchant pig iron producer here, following the $3 per ton advance announced by E. & G. Brooke Iron Co., Birdsboro, Pa., Jan. 22. Increases in iron ore, coke and scrap prices have combined to substantially increase blast furnace operating costs, but decision on further advance in prices likely will await outcome of present labor negotiations. Certified pig iron tonnage program, scheduled to be continued through first half and perhaps longer, is expected to have an adverse effect on operations of non-rated users. Certified foundries now are getting into full production and, although they represent less than 10 per cent of the number of foundries in this district, their tonnage allotments aggregate more than 40 per cent of the lone merchant producer's output.

Another factor accentuating present tight pig iron supply outlook is price relationship between pig iron and scrap. Some foundries are unwilling to pay high cast scrap prices and are attempting to use more pig iron, while steel producers are using greater portion of hot metal in open-hearth operations. Cast scrap supply is reported slightly improved.

Buffalo—Hopes for improved foundry operations were kindled during the week as district pig iron output returned to wartime levels with only one out of sixteen stacks idle. The leading merchant iron seller in the area resumed capacity operations for the first time since the recent coal strike by relighting its fourth and only inactive unit. The third unit was blown in the previous week. Slow rail movements of loaded cars, coupled with the car shortage further aggravate consumers. Tonnage consigned to Eastern buyers is hurt by the rail situation.

Cincinnati—Most recent allotments of pig iron hold to recent volume, blocking any hopes of foundries for an early expansion in the melt. Most of the nonrated foundries, however, are able to operate five days. Reserves, as heretofore, in iron, scrap and coke are critically low.

Birmingham — CPA threw bombshell into Southern iron market last week with disclosure that 96 per cent of the output would be channeled into the veteran housing program. Great concern is expressed in the district due to the already acute shortage of iron for many essential uses. Protests have gone to the capital from furnace interests, the Chamber of Commerce and industry generally over the alleged unfair distribution of the iron burden which channels only 23 per cent of Northern iron into the housing program. Many local industries, especially foundries, likely will be forced to close.

Under a new ruling by the Office of Housing Expediter an extra premium no longer will be paid cast iron soil producers who purchased their pig iron from Republic Steel Corp.'s plant at Birmingham. The ruling applies unless purchases were made prior to Dec. 1, 1946, and the pig iron is used not later than Feb. 28, 1947. OPA originally had allowed the plant to charge a higher price for pig iron because of higher than normal production costs. The extra premium payments were allowed to compensate for the higher cost to the cast iron soil pipe producers.

Seattle—Unless restrictions on pig iron are eased, the local foundry industry

may have to close. No pig is obtainable from Geneva. Government regulations are channeling output into home building projects and foundries meanwhile are depending largely on cast iron scrap on which buyers have established a ceiling of $27.50 a gross ton. However, scrap supplies are far below demand. Agencies for pig report there is little prospect of obtaining this material until a surplus has accumulated and the home building program has sufficient. The price is $30 base.

Tin Plate . . .

Tin Plate Prices, Page 159

Chicago—Tin mill operations are being maintained at a high rate but production falls short of meeting consumers' demands. Meanwhile, shortage of box cars stands as a constant threat to movement of production from mills. Milwaukee breweries are advertising beer in cans in March or April, indicating that can makers are returning to limited production of containers for this purpose.

Scrap . . .

Scrap Prices, Page 164

Pittsburgh — For scrap originating in this district mills continue to set a ceiling of $32.50 per ton for open-hearth grades. However, since mills here must purchase remote scrap (much of which originates from customers) to meet between 20 and 30 per cent of their requirements, considerable tonnage is shipped here based on market price or less at remote points commensurate with relationships between consumer and suppliers. Mills compare the present situation with that under OPA when they frequently had to pay up to $4.50 springboard to obtain badly needed material. Thus, the increase in scrap prices from remote areas (ranging up to $38 in some instances) is the result of the higher prices that must be paid for material at those points plus necessary freight to destination.

Exorbitant scrap prices have revived rumors to the effect that steel producers plan to expand bessemer converter operations. Installation of more bessemer units would relieve the general scrap shortage through making available more hot metal and production of synthetic scrap. Great Lakes Steel Corp. plans to build a bessemer converter plant at Ecorse, Mich., and it is rumored that a similar expansion is planned by Weirton Steel Co. and other producers.

New York—Scrap brokers are paying slightly more for steel mill grades, offering $30 to $30.50 for heavy melting, busheling and Nos. 1 and 2 bundles, and $28 to $28.50 for No. 3 bundles. Machine shop turnings and mixed borings and turnings are being bought at $22 and short shovel turnings at $24. Punchings and plate scrap are moving at $32, electric furnace bundles at $31 and cut structural and plate scrap at $32. Cast grades are unchanged.

Philadelphia — With strong pressure for steel mill scrap from outside, as well as from within this district, delivered prices in this area again have advanced. No. 1 and No. 2 heavy melting steel, No. 1 busheling, and Nos. 1 and 2 bundles are now holding at $33.50 to $34; No. 3 bundles at $31 to $31.50; machine shop turnings, mixed borings and turnings, short shovel turnings and cast iron borings at $25. Low phos,

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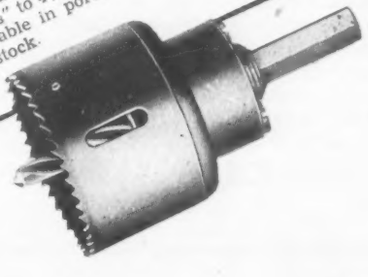
The same exclusive *unbreakable* feature of MARVEL Hack Saw Blades is also a feature of MARVEL Hole Saws, giving these saws the ability to stand up under abuse. MARVEL Hole Saws cut holes from ⅝" to 4½" diameter in stock up to 1⅛" thick. Usable in portable drill, drill press, or lathe tail stock.



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Complete Range of Metal Sawing Machines
Being the largest exclusive manufacturer of metal sawing machines and blades, both hack saw and band saw type, we have the correct answer to your cut-off problems. Each MARVEL model has a distinct application, so write us and we will send our catalog, price, and recommendation for the saw to fill your requirements most efficiently. MARVEL sawing engineers are also available to discuss and analyze your cut-off work. (Without obligation of course)

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foundry and special grades are fairly stable, although bar crops and plate, cast steel, punchings and plate scrap now appear to be holding at around $36, delivered, against a spread recently of $35 to $36.

Cast grades have been advanced to $45 to $46 on cupola cast, $43.50 to $44 on charging box cast and heavy breakable cast, $41.50 on unstripped motor blocks, $45 to $46 on malleable and clean auto cast, and $44 to $45 on No. 1 wheels.

Boston—Steel scrap prices have advanced $5 a ton since the first temporary stabilization at $25, shipping point and $29 for eastern Pennsylvania has been met by the New England consumers, although reluctantly. The latter are critically low on scrap and to maintain operations they are frequently forced to buy, although between times prices have increased on the basis of outside sales. Considerable dent has been made in yard scrap accumulations which had been built up in anticipation of price decontrol. Shipments have been substantially sustained by this material. Some larger users of cast are not contributing to sustained high prices for those grades, in part reflecting an improved pig iron supply, but enough foundries are still short of melting materials to maintain cupola cast and other grades at recent tops.

Buffalo—One of the top mill consumers in the area has been able to avoid, at least for the present, a curtailment in operations because of insufficient scrap. Higher prices have augmented recent receipts and aided the mill in forestalling talk of paring output. This improvement, however, is not overall. Other mills report little change in collections. Dealers likewise find supplies holding about the same.

Chicago—Near zero weather most of last week interfered considerably with scrap yard operations, nevertheless scrap was reaching mills in reasonably good volume. Having pushed steelmaking operations up another point to 91 per cent of capacity, highest since last November, mills are seeking material aggressively. To augment home scrap, mills are buying limited quantities of remote material and willingly paying the freight involved. Outside districts are bidding for Chicago district scrap, but little is being lost because bulk of scrap made in this area is earmarked for local mills. Prices of virtually all grades of scrap are firm, with open hearth holding at the $30 level and so far unaffected by the stronger tone of eastern markets.

Cincinnati — Heavy melting steel and cast scrap prices advanced $1 in this district last week as the former price level yielded to pressure of demand and to influences in neighboring districts. Other scrap items followed suit. The rise signalled failure of some major consumers to prevent further advance, and the trend still appears upward.

St. Louis — Scrap prices rose sharply last week, bringing the present level to about that of OPA ceilings. Cast grades were not affected, however. The rise in open hearth and railroad metal was attributed to the urgent necessity of mills' stopping the draining of scrap from this area by Chicago and Pittsburgh. Mill inventories here are generally under 30 days with pig iron scarcities crowding them steadily lower. Mills have about reached the highest practical ratio of scrap in their mix now. Foundry reserves are 45 days and melters have been pulling out of the scrap market whenever a few days' stock was accumulated, thus tending to curb a rise in cast prices.

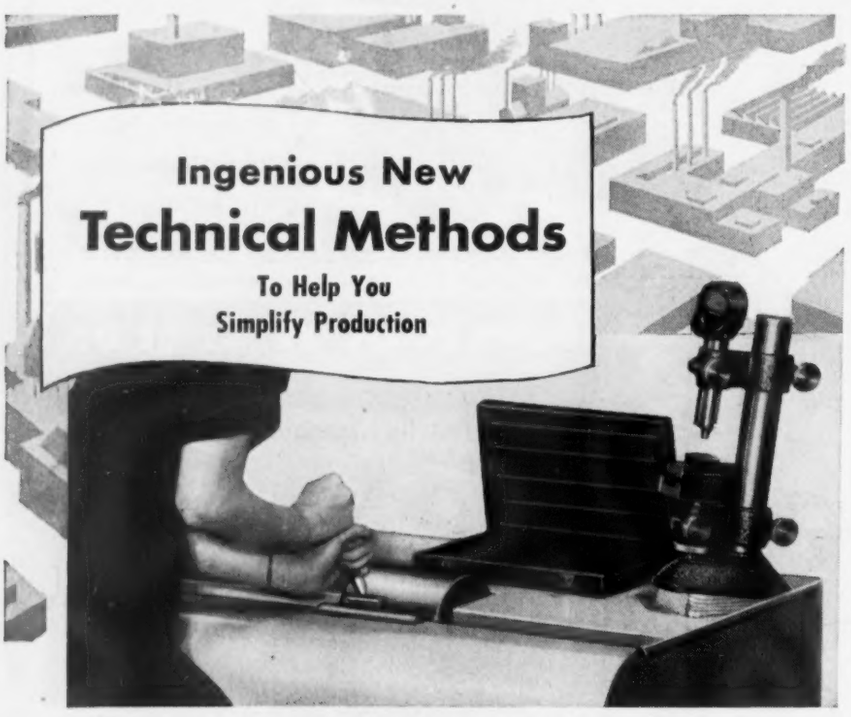
Warehouse . . .

Warehouse Prices, Page 161

Chicago—As a result of limited mill receipts and tremendous consumer demand, warehouses report inventories of sheets at the lowest level in many years. Conditions almost as bad exist in small carbon bars, light structurals and plates and wire products. Since mill shipments to distributors are relatively higher than during the war, all this is a reflection of the terrific overall demand for steel. The recent price increases appear to have made little difference in volume of warehouse business.

Philadelphia—Most leading jobbers report January business as having surpassed that of the preceding month but as having fallen short of the volume in the corresponding month a year ago when there was much anticipatory buying because of the impending steel strike which developed in the latter part of that month.

Boston—On some products where supply approximates demand, distributors are curtailing or deferring orders, but pressing hard for lighter carbon items for which inquiry is heaviest and inventories limited. Alloys, including stainless, heavier carbon rounds, flats and squares, also tool steel and specialties, are in ample supply for current buying.



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The operator merely holds piece between lapping rolls with stick. Pressure applied determines quantity of metal removed. Small roll turns piece at slow constant rate. Large roll turns more rapidly to remove minute quantities of metal. Ideal for lapping oversize gages, worn gage plugs to next smaller size, bearings, bushings or shafts. Roll speeds easily changed. Adjustable for tapers.

Centerless Lapping Machine

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AB-54

With some, receipts of structural shapes are improved, but plates, small bars and flat-rolled stocks are not sufficient to meet demand. Although some mills have opened books for the second quarter, a substantial part of warehouse volume for that period is yet to be definitely scheduled. Volume of strip steel going to warehouses is nil.

Rails, Cars . . .

Track Material Prices, Page 159

Pittsburgh — Determination of 1947 steel requirements for freight car construction and repair programs was scheduled to be announced late last week. Allocation of this tonnage is expected to be on a voluntary basis rather than under government sponsored directive. Car builders state they can meet projected 1947 domestic car construction program of 84,000 units if materials are made available. Materials in particular short supply include: Plates, pipe, sheets, steel wheels, and lumber. Iron wheels may have to be substituted on some domestic cars this year.

Active bidding for limited supply of relaying rails by scrap dealers and others has forced a sharp upturn in prices, with isolated sales in small quantities reported at over $50 per ton. However, bulk of tonnage is sold within range of $43 to $46 per ton for rails 35 pounds and over. Sweet's Steel Co., Williamsport, Pa., has established a price base at Williamsport at $2.95 per 100 pounds for light rails rolled from rail steel.

New York — Award of 4000 hopper cars by the Baltimore & Ohio features car buying. Two thousand will be built by Bethlehem Steel Co., Bethlehem, Pa., 1000 by American Car & Foundry Co., New York, 500 by Pressed Steel Car Co., Pittsburgh, and 500 by Ralston Steel Car Co., Columbus, O. A leading locomotive award involves 34 diesel engines by the Erie. Ten steam locomotives are being figured by the New York Central for operation on the Pittsburgh & Lake Erie.

Canada . . .

Toronto, Ont. — Iron and steel production in Canada registered a sharp gain in December. Pig iron output totaled 161,464 net tons, 69.9 per cent of capacity, compared with 135,269 tons or 58.5 per cent in November and 135,225 tons in December, 1945. Production of ferroalloys in December rose to 11,766 net tons from 9,370 tons in the previous month and compares with 15,456 tons in December a year ago.

Output of steel ingots and castings for December totaled 237,300 net tons, 78.5 per cent of capacity, compared with 222,644 tons in November and 219,281 tons in December, 1945.

The strike at Canada's basic steel mills, which lasted for 81 days, was reflected in a sharp decline in the overall output for the year. Pig iron production for 1946 totaled 1,403,758 net tons, compared with 1,777,958 tons in 1945 and 1,852,628 tons in 1944. Production of ferroalloys amounted to 116,995 net tons compared with 186,978 tons in 1945 and 182,428 tons in 1944.

Output of steel ingots and castings in 1946 totaled 2,334,631 net tons compared with 2,881,323 tons in 1945 and 3,024,410 tons in 1944.

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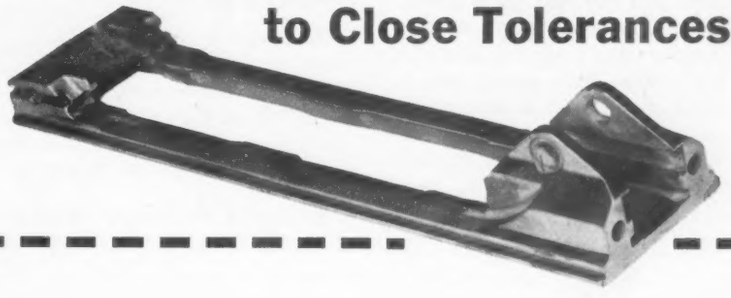

As a result of its wartime activities in manufacturing gun parts, which brought the Army-Navy Award with three stars, the Hendrick plant now has surplus facilities available for making small to medium size precision products to close tolerances. In fact, it is a common procedure for Hendrick's experienced machine tool operators to work to a tolerance of .0005 inches.

If you will submit specifications and samples of products on which you wish quantity prices, we will quote promptly.

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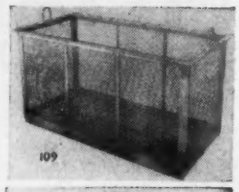

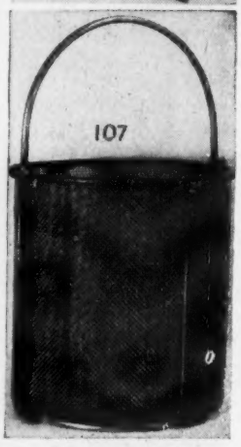

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When you have a BURRO in the yard, you get jobs done faster, easier and more economically. This speedy, powerful locomotive crane does every job a crane can do with bucket, hook, magnet, tongs or drag-line and at the same time, serves as your private switch engine to spot cars *where* and *when* you want them. There is no waiting time with a BURRO.

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CULLEN-FRIESTEDT CO.
1308 S. Kilbourn Ave., Chicago 23, U.S.A.

Mills To Provide Steel for 7000 Freight Cars Monthly

(*Concluded from Page 65*)

shortages during 1946, ODT's arguments for additional allocations went unheeded until December.

The ODT director said he has asked for enlarged allotments of pig iron for production of chilled car wheels and other castings and he referred to the fact that the Reconstruction Finance Corp. had disapproved an ODT plan for government underwriting purchase of 50,000 freight cars, indicating that this might merit the attention of the Senate committee.

Shortage of freight cars is more acute today than it has been for six or seven years, he said, pointing out that production of cars has been decreasing in recent months and in addition 5000 to 7000 cars are being retired monthly. Instead of increasing, overall supply actually has been decreasing at the rate of 2500 cars monthly, he said, estimating that present needs call for 300,000 new cars.

The committee was urged by Johnson to give the Interstate Commerce Commission power to adjust the daily charge for freight cars used by railroads other than those owning the cars, estimating that if the ICC raised this rate from the present $1.15 per day to $2 it would force the roads to use cars so much more efficiently that the effect would be to add an immediate 40,000 to 50,000 cars to the transportation system.

Assurances have been received from the American Iron & Steel Institute and other representatives of the steel industry that steel sufficient to build 10,000 cars monthly would be provided, Colonel Johnson said. Also steel will be made available for repairs and maintenance, and components suppliers have promised to meet the demands of the ODT program.

He criticized the railroads for not ordering more cars, declaring that only 78,000 were now on order whereas the number should be 150,000 to 200,000. With the new freight rates in effect Jan. 1 the railroads no longer have an excuse for not ordering, he said.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2000 tons, heavy forging work, cyclotron magnet, Columbia University, New York, to Bethlehem Steel Co., Bethlehem, Pa.

1000 tons plus, chipper and barker plants, St. Regis Paper Co., Tacoma, Wash., to Isaacson Iron Works, Seattle.

900 tons, extension to sludge disposal building, Div. Qb, West-Southwest sewage treatment works, Chicago, for Sanitary District of Chicago, to Bethlehem Steel Co., Bethlehem, Pa.; bids Jan. 9.

720 tons, steam station, Tampa Power & Light

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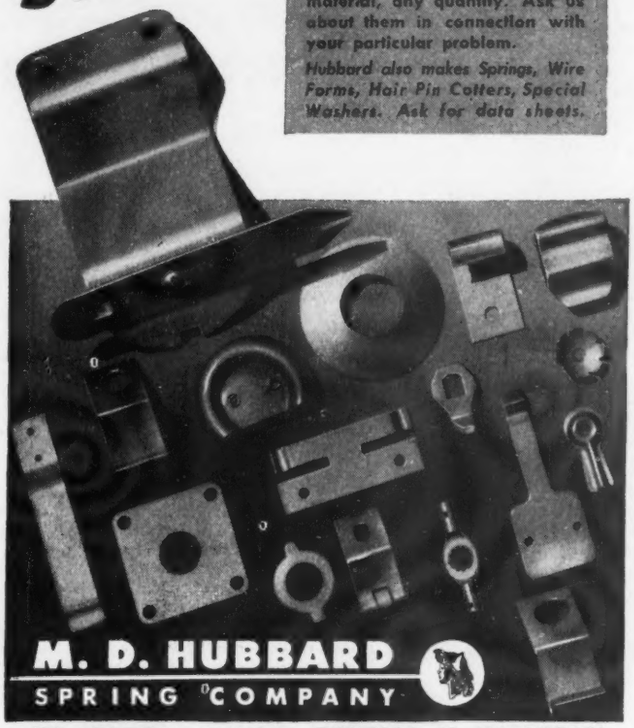

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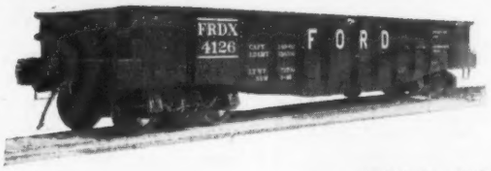
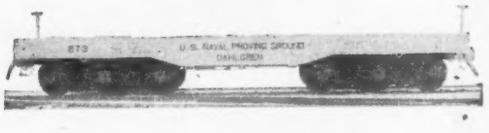
GREENVILLE STEEL CAR COMPANY
(SUBSIDIARY OF PITTSBURGH FORGING COMPANY)

MILL TYPE

GONDOLA
Capacity — 140,000 lbs.
Length — 37' 9½"
Width — 10' 0½"
Weight—33,700 lbs.
Journals — 6"x11"
Gauge — 4' 8½"

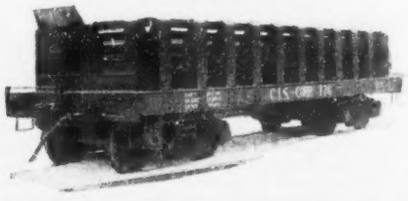


ARMORED DECK FLAT CAR
Capacity — 275,000 lbs.
Length — 36' 0"
Width — 9' 6"
Weight—76,800 lbs.
Journals — 6"x11"
Gauge — 4' 8½"



SKULL CAR
Capacity — 200,000 lbs.
Length — 25' 2"
Width — 8' 0"
Weight—45,800 lbs.
Journals — 6"x11"
Gauge — 4' 8½"

CROP END CAR
Capacity — 180,000 lbs.
Length — 25' 6"
Width — 7' 5½"
Weight—78,500 lbs.
Journals — 6½"x12"
Gauge — 4' 8½"



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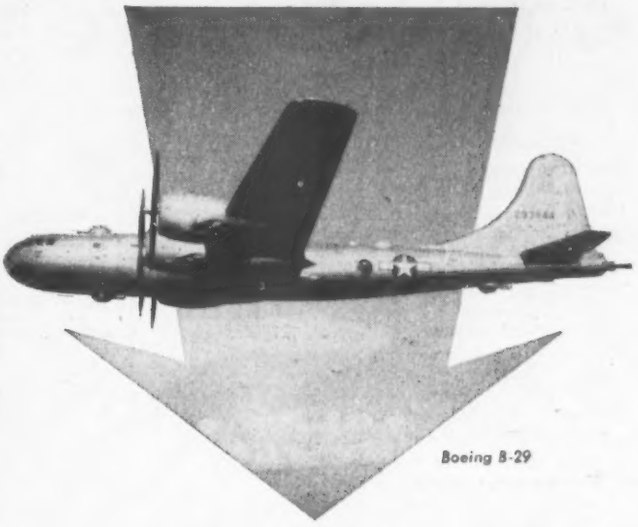

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Co., Tampa, Fla., to Bristol Steel & Iron Works Inc., Bristol, Va., through Stone & Webster Engineering Corp., Boston.

675 tons, research laboratory, Johns-Manville, Linderne, N. J., to Belmont Iron Works, Eddystone, Pa.

500 tons, addition to Bellingham, Wash., paper plant to Isaacson Iron Works, Seattle.

390 tons, building, Pasadena, Tex., for Ebasco Services Inc., to Virginia Bridge Co., Roanoke, Va.; bids Sept. 3.

100 tons, federal bridge and miscellaneous projects, to Isaacson Iron Works, Seattle.

STRUCTURAL STEEL PENDING

2200 tons, building, Lexington, Ky., for University of Kentucky.

1275 tons, approach, spans and ramps, Passaic River bridge, East Newark-Harrison, N. J.; also 18,150 linear feet, steel piles; bids Feb. 24, Trenton, N. J.

1200 tons, 12-story apartment for the East River Cooperative Apartments Inc. at Grand St. and the East River, N. Y., bids asked.

700 tons, extension, water gas generating house for Consolidated Edison Co., Hunts Point, Bronx, New York city, pending.

600 tons, extension to bakery, Hanscom Baking Corp., Long Island City, N. Y., bids asked.

Unstated, addition to Portland-Columbia airport, Portland, Oreg., for Northwest Air Lines; bids to Portland, Feb. 5.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1000 tons, grain elevators in eastern Washington, to Bethlehem Pacific Steel Corp., Seattle.

300 tons, state bridge, Yakima county, Washington, to Bethlehem Pacific Steel Corp., Seattle.

REINFORCING BARS PENDING

1600 tons, Columbia Basin main canal; bids to Bureau of Reclamation, Denver, Feb. 6.

475 tons, approach, spans and ramps, Passaic River Bridge, East Newark-Harrison, N. J.; bids Feb. 24, Trenton, N. J.

300 tons or more, three Washington State College buildings; bids at Seattle, Feb. 7; $3 million project.

150 tons, Washington state highway jobs; bids to Olympia, Feb. 18.

108 tons, also steel pipe, gates, etc., for Boise project and Tule Lake project; bids to Bureau of Reclamation, Denver, Mar. 4 and 3, respectively.

100 tons, ¾ to ⅝ in.; bids to Bonneville Power Administration, Portland, Oreg., Feb. 14.

Unstated, $750,000 dairy plant for Avoset Corp., Nyssa, Oreg.; Bechtel Bros. & McCone, San Francisco, general contractors.

PIPE . . .

CAST IRON PIPE PLACED

750 tons, for Spokane, Wash., to Hughes & Co., for Pacific States Cast Iron Pipe Co., Provo, Utah; delivery, 150 to 200 days.

625 tons, 6 to 12-inch cast iron pipe, Pawtucket, R. I., to U. S. Pipe & Foundry Co., Burlington, N. J., only bidder.

365 tons, 42-inch cast iron pipe, Tampa Power & Light Co., Tampa, Fla., to U. S. Pipe & Foundry Co., Burlington, N. J., through Stone & Webster Engineering Corp., Boston.

125 tons, King county, Washington, district No. 7, 10,000 ft, 6 in., to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

CAST IRON PIPE PENDING

350 tons, various sizes for city of Seattle use; bids opened Feb. 6.

STEEL PIPE PLACED

300 tons, welded pipe, Consolidated Edison Co., Astoria, Long Island, to Bethlehem Steel Co., Bethlehem, Pa.

STEEL PIPE PENDING

Unstated, 115,950 ft, 12 to 4 in. water pipe, for Hazel Dell district, Vancouver, Wash.; $200,000 project; also involves 7000 service meters; bids soon to Henry L. Gray, engineer, Seattle.

Unstated, 1800 ft, 6 in. water pipe, alternate transite; bids to Vancouver, Wash., Feb. 19.

RAILS, CARS . . .

RAILROAD CARS PLACED

Baltimore & Ohio, 4000 hoppers, 2000 going to Bethlehem Steel Co., Bethlehem, Pa., 1000 to American Car & Foundry Co., New York, 500 to Pressed Steel Car Co., Pittsburgh, and 500 to the Ralston Steel Car Co., Columbus, O.

Missouri Pacific railroad, eight stainless steel coaches, to the Budd Co., Philadelphia.

Norfolk & Western, 20 stainless steel sleeping cars, to the Budd Co., Philadelphia; each car will include 10 roomettes and 6 double bedrooms, providing sleeping facilities for 22; delivery is promised for the first quarter of next year.

LOCOMOTIVES PLACED

Erie, 34 Diesel locomotives, comprising 25 switch engines and 9 freight engines, to the American Locomotive Co., New York, Electro Motive Div. of General Motors Corp La Grange, Ill., and Baldwin Locomotive Works, Eddystone, Pa.

Norfolk Southern railroad, 10 diesel-electric 1500-horsepower freight engines, to Baldwin Locomotive Works, Eddystone, Pa.; cost, $1,500,000.

LOCOMOTIVES PENDING

New York Central, ten 2-8-4 type locomotives for the Pittsburgh & Lake Erie, bids asked.

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CONSTRUCTION AND ENTERPRISE

CALIFORNIA

BELL, CALIF.—Apex Steel Corp., 6111 S. Eastern Ave., Los Angeles, will construct a corrugated iron shop building for fabricating structural steel at 6920 E. Slauson Ave. Plant will contain 28,300 sq ft of floor space, and will cost $79,000.

LOS ANGELES—Ace Enameling Co. Inc. has been organized with capital of $75,000. Company is represented by John O. Mead, 615 Broadway Arcade Bldg.

LOS ANGELES—Harris Enterprises Inc. has been organized with a capital of $250,000 to deal in iron, steel and other metals. Benjamin & Kronick, 1425 Chapman Bldg., represent the firm.

LOS ANGELES—Carpenter Engineering Corp. has been formed with capital of $150,000 to manufacture and deal in tools, parts and machines. J. S. Tatlow, 402 S. Alvarado St., represents the firm.

NILES, CALIF.—Pacific States Steel Corp., Marion Newman, general manager, Alvarado-Niles Rd., Alameda County, Calif., is having plans prepared for construction of three steel plant buildings to house additional rolling mill equipment and melting facilities. Approximate cost is $500,000.

ILLINOIS

EAST ST. LOUIS, ILL.—East St. Louis & Interurban Water Co., C. M. Roos, manager, 513 Missouri Ave., is installing 60 fire hydrants and is constructing a 12-inch water line to serve outlying districts that will cost an estimated $350,000.

IOWA

ALLERTON, IOWA—Central Farm Products Co., Trenton, Mo., has awarded a contract

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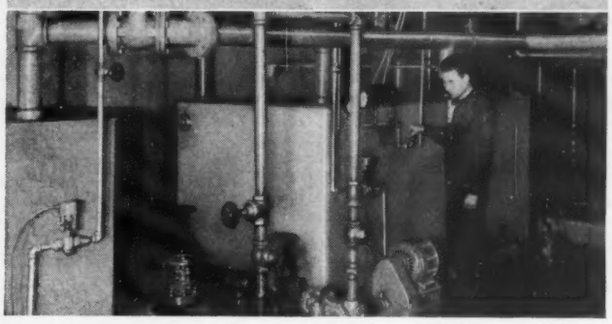

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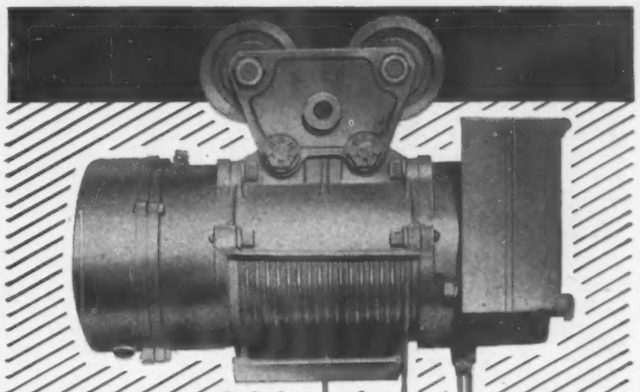

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for the erection of a $200,000 milk processing plant to Ebbe Construction Co., Trenton, Mo.

MICHIGAN

BRONSON, MICH.—K & L Tool & Die Co., 312 Franklin St., has been formed to manufacture and repair tools, dies, jigs and fixtures. Paul E. Knapp is principal in the company which has a capital of $50,000.

DETROIT—Harry W. Dietert Co., 9330 Roselawn, has been organized with a capital of $200,000 to manufacture and sell machinery.

DETROIT—Thornell Corp., 12931 Westwood, has been formed with Charles B. Thornell as principal of the $250,000 firm which will manufacture and sell tools, dies, and metal products.

DETROIT—Active Tool & Mfg. Co., 888 Clairpointe Ave., has been incorporated by Henry Drettmann for manufacture of tools, jigs, dies and fixtures. Capitalization is $1 million.

DETROIT—Brass Industries Inc., 7939 W. Lafayette Blvd., has been organized for a foundry and machine shop business. With Harry B. Aronow as principal, firm is capitalized at $100,000.

DETROIT—Consumers Metal Corp., 7777 W. Chicago, has been formed with $270,000 capital by J. Leon Gittlen to deal in metals and ores.

DETROIT—Putnam Tool Co., 2981 Charlevoix, has been formed with a capital of $50,000 by Ernest C. Putnam to manufacture precision cutting tools.

DETROIT—Royal Motor Products Corp., 909 Michigan Bank Bldg., has been formed with a capital of $50,000 by Meyer Weisenfeld to manufacture and sell generators and fuel pumps.

DETROIT—Barton Brass Works Inc., 2818 E. Grand Blvd., has been formed by Hiram J. Barton as a general foundry business with a capital of $50,000.

DETROIT—Detroit Tool Industries Inc., 7441 Grand River Ave., has been formed by Lee A. Cusen with a capital of $50,000 to design and sell tools, jigs and fixtures.

GRAND RAPIDS, MICH.—Grand Rapids Castings Co., 1315 Michigan N.E., has been organized to manufacture and sell metal products. Donald G. Denison is principal in the firm which is capitalized at $50,000.

HAMTRAMCK, MICH.—Michigan Steel Processing Co., 3120 Denton, has been formed by Francis J. Steigerwald with a capital of $50,000.

HIGHLAND PARK, MICH.—Abrasive Dressing Tool Co., 14528 Second Blvd., has been formed to manufacture and sell tools. Jerry Krandall is principal of the firm which is capitalized at $100,000.

JACKSON, MICH.—Blank & Burton Machinery Inc., 3100 E. Michigan Ave., with a capital of $100,000 has been formed by John E. Blank to manufacture and sell machinery.

LANSING, MICH.—Patbard Casting Co., 1108 Olds Tower Bldg., has been formed by Walter F. Patenge. Planned as a general foundry and machine business, the firm is capitalized at $50,000.

LANSING, MICH.—Capitol Erection & Welding Co., 1108 Olds Tower Bldg., has been formed as a welding and steel erection business. Raymond A. Ewer is principal in the firm which is capitalized at $100,000.

LUDINGTON, MICH.—Atkinson Mfg. Co., 502 S. James St., has been organized for a general manufacturing business by Truman L. Atkinson Sr. with a capital of $200,000.

PORT HURON, MICH.—Flinchbaugh Electric Co., 762 Water St., has been formed by John W. Flinchbaugh with a capital of $100,000 to manufacture and sell electrical machinery.

ROMULUS, MICH.—Seestedt Foundry Co., 36115 Goddard Rd., has been formed as a foundry and machine shop business by Emery M. Seestedt. The capital is $150,000.

NEW YORK

BUFFALO—Wickwire Spencer Steel Division of Colorado Fuel & Iron Corp. will spend between $700,000 and $1 million on improvements in its Tonawanda River Road plant.

OHIO

ALLIANCE, O.—Pennsylvania Railroad proposes to build a passenger and freight station here on the site of the old one.

ASHLAND, O.—Rybolt Heater Co., 615 Miller St., will construct a building to house the steel division, reconvert the foundry and add storage facilities.

CLEVELAND—Ohio Electric Mfg. Co., 5900 Maurice Ave., is retooling and installing new machinery for increased production of motors.

CLEVELAND—Turret Tool & Die Co. has been established at 801 E. 93rd St. New firm is purchasing machinery and equipment.

NILES, O.—Republic Steel Corp. suffered damage estimated at $50,000 from a fire caused by a short circuit in its plant here.

NILES, O.—National Gypsum Co. is planning a $600,000 expansion program which includes adding 15,000 sq ft of floor space, new machinery and equipment and more office space. Work will start April 1.

TEXAS

BROWNSVILLE, TEX. — Carthage Hydrocol Inc., G. C. Gabrielson, president, has awarded contract for a $15 million gasoline manufacturing plant to Arthur G. McKee Co., 2300 Chester Ave., Cleveland. Hydrocarbon Research Inc., 115 Broadway, New York, is engineer and architect.

DALLAS, TEX.—Massey-Harris Co. will enlarge its branch operations with erection of $400,000 warehousing, servicing and office structure on a four acre site. Christensen & Christensen, Dallas, will be associated with the company's own architect; Jack Elliott, in supervising construction.

EL PASO, TEX.—El Paso Machine Works plans to build a structural steel fabricating plant at 1600 E. Fourth St. to cost $50,000.

HOUSTON, TEX. — Crane Co., 2205 McKinney St., will build a 193 x 232 ft warehouse and office building to cost about $225,000. Lubeck & Dederick Construction Co., 1532 Peden St., is contractor.

HOUSTON, TEX. — Shell Pipe Line Corp., Shell Bldg., has asked for bids on a 100-mile pipeline from Sheridan to Houston, Tex. Estimated cost for the 6 in., welded joint, oil line is $1,240,000.

LIBERTY, TEX.—Texas Gulf Sulphur Co. has announced plans to build a $2 million plant. Contract has been awarded to Consolidated Steel Co., Orange, Tex.

PORT ARTHUR, TEX. — Gulf Oil Refining Corp., Port Arthur, will soon let contracts for a 52 x 22 ft tin shop costing $65,000 and a 102 x 462 ft boiler shop costing $200,000.

SPEARMAN, TEX.—Michigan-Wisconsin Pipe Line Co., c/o Frank L. Congrad, 105 W. Adams St., Chicago, is asking for bids on a $2,500,000 contract for booster stations.

WASHINGTON

RICHLAND, WASH.—General Electric Co. has awarded a contract to Morrison-Knudsen Co., Boise, Ida., for construction of tanks at the atomic material plant near here.

SEATTLE—Bethlehem Pacific Steel Co. is installing two 15,000-gal. oil storage tanks at plant, 3800 Iowa St. Contract goes to Washington Steel & Welding Co.

SPOKANE—Spokane Metals Co. states that plans for an additional warehouse and machine shop have been deferred.

SPOKANE—Columbia Electric & Mfg. Co., Walter Folev, vice president, has authorized a $150,000 plant expansion at W. 102 Ida St.

TACOMA, WASH. — Permanente Metals Corp., S. 26 and Perrelli Richmond Sts., Oakland, Calif., has contracted with General Construction Co., 3840 Iowa St., Seattle, to build and equip a $1 million aluminum reduction plant.

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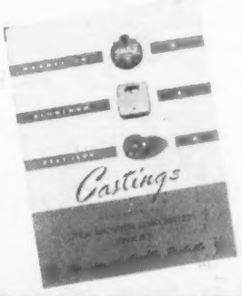

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Model P-401—Rubber cap on spindle serves as protection when two different materials must be held together. Curved handles make for comfortable operation.

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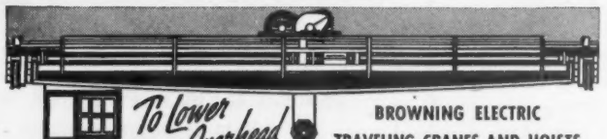

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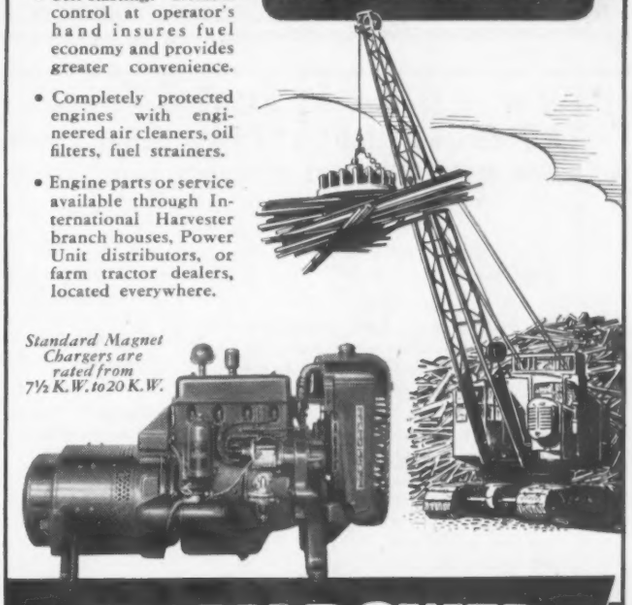

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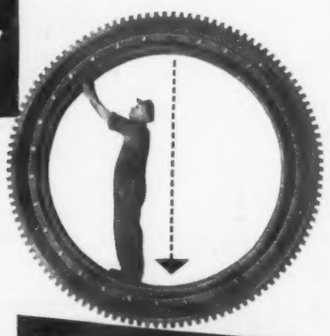

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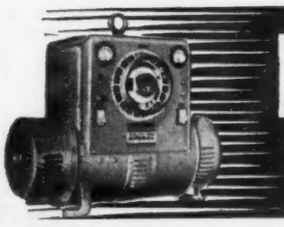

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27,285 lbs. 6 x ⅛" Band Iron approximately 20 ft.
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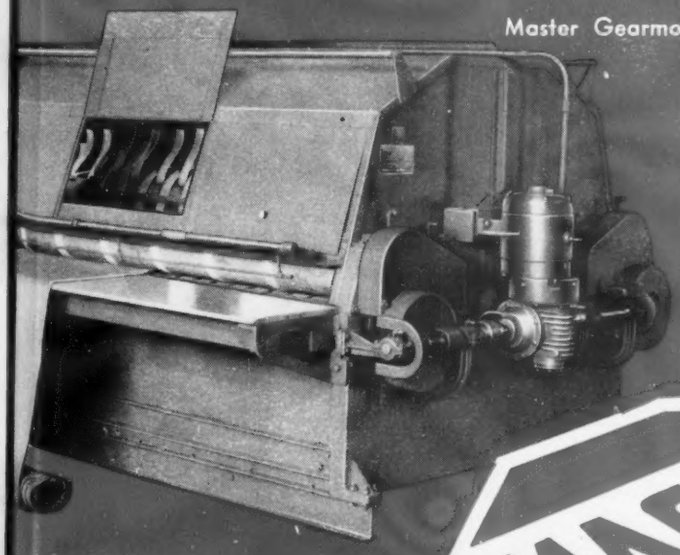

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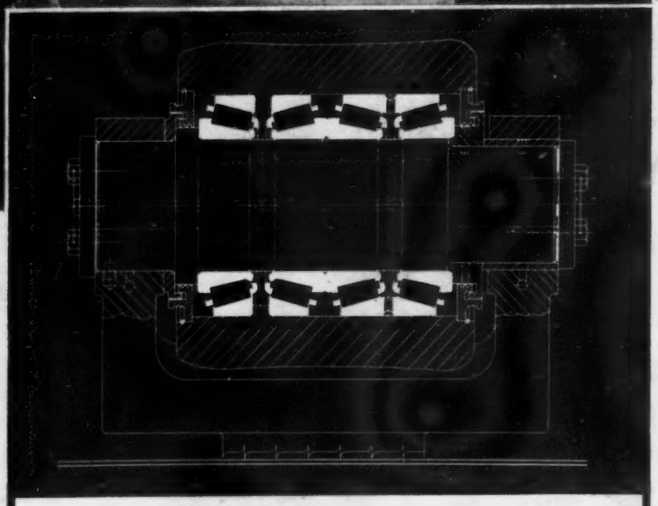

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